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**Aerospace Medicine and Biology**
A Continuing Bibliography with Indexes

NASA SP-7011(227)
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Accession numbers cited in this Supplement fall within the following ranges.

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| STAR (N-10000 Series) | N81-32114 – N81-34139 |
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NASA SP-7011(227)

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

### (Supplement 227)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1981 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 166 reports, articles and other documents announced during December 1981 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1981 Supplements.

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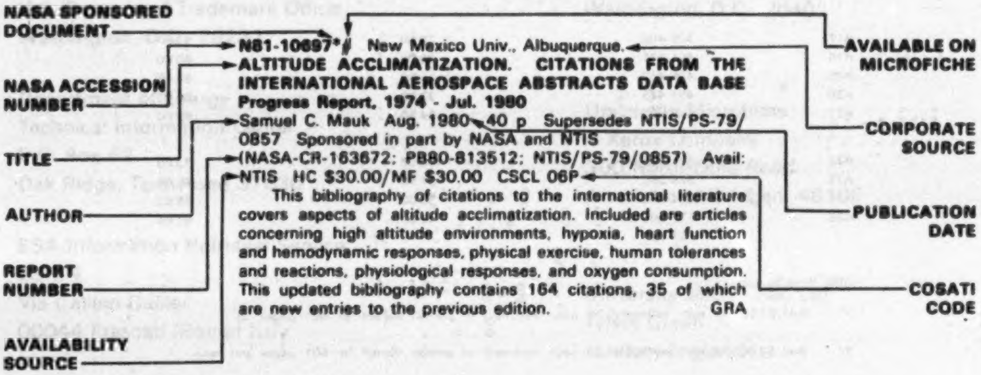
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**N81-10697*#** New Mexico Univ., Albuquerque.
**ALTITUDE ACCLIMATIZATION. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Jul. 1980**
Samuel C. Mauk Aug. 1980 40 p Supersedes NTIS/PS-79/0857 Sponsored in part by NASA and NTIS
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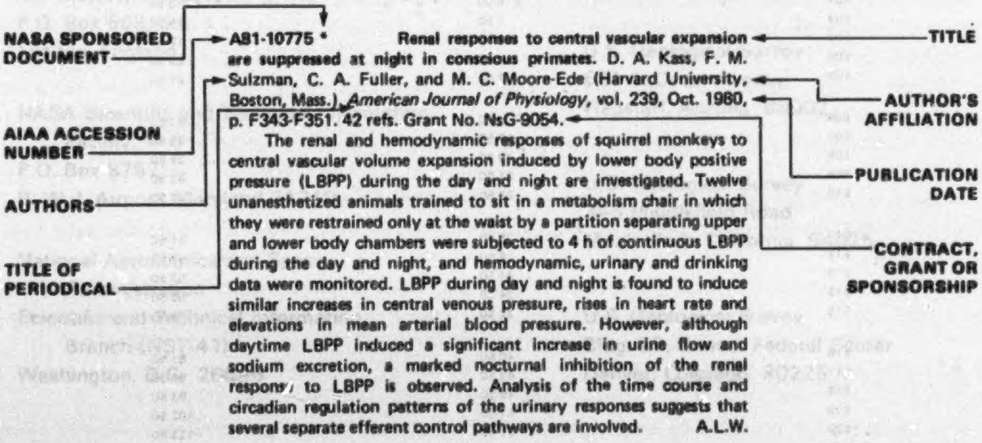
This bibliography of citations to the international literature covers aspects of altitude acclimatization. Included are articles concerning high altitude environments, hypoxia, heart function and hemodynamic responses, physical exercise, human tolerances and reactions, physiological responses, and oxygen consumption. This updated bibliography contains 164 citations, 35 of which are new entries to the previous edition. GRA

## TYPICAL CITATION AND ABSTRACT FROM *IAA*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**A81-10775 *** **Renal responses to central vascular expansion are suppressed at night in conscious primates.** D. A. Kass, F. M. Sulzman, C. A. Fuller, and M. C. Moore-Ede (Harvard University, Boston, Mass.) *American Journal of Physiology*, vol. 239, Oct. 1980, p. F343-F351. 42 refs. Grant No. NsG-9054.

The renal and hemodynamic responses of squirrel monkeys to central vascular volume expansion induced by lower body positive pressure (LBPP) during the day and night are investigated. Twelve unanesthetized animals trained to sit in a metabolism chair in which they were restrained only at the waist by a partition separating upper and lower body chambers were subjected to 4 h of continuous LBPP during the day and night, and hemodynamic, urinary and drinking data were monitored. LBPP during day and night is found to induce similar increases in central venous pressure, rises in heart rate and elevations in mean arterial blood pressure. However, although daytime LBPP induced a significant increase in urine flow and sodium excretion, a marked nocturnal inhibition of the renal response to LBPP is observed. Analysis of the time course and circadian regulation patterns of the urinary responses suggests that several separate efferent control pathways are involved. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## *A Continuing Bibliography (Suppl. 227)*

JANUARY 1982

## IAA ENTRIES

**A81-47150** # **Oxygen provision to humans under conditions of high-altitude flight (Obespechenie cheloveka kislorodom v usloviiakh vysotnogo poleta).** L. G. Golovkin, V. A. Glazkova, I. V. Maksimov, and I. N. Cherniakov. *Voenno-Meditsinskii Zhurnal,* July 1981, p. 50, 51. In Russian.

Human functional responses during the use of the KP-56 oxygen supply system with an open-type face mask, allowing the mixture of supplied oxygen with cabin air, are investigated under simulated high-altitude conditions. Electrocardiograms, respiratory frequency, alveolar gas composition and blood oxygen levels were determined and psychophysiological responses were evaluated in 10 healthy subjects wearing the KM-15M mask at a simulated altitude of 8 km for up to 4 hours and at 10-12 km for up to 1 hour. Results demonstrate a normal oxygen supply after 4 hours at 8 km with the subjects performing physical and mental work, thus justifying the use of the KP-56 system with the KM-15M mask as a life-support system during extended flight in an uncompressed cabin. Signs of oxygen deprivation and cases of decompression sickness are observed at the higher altitudes, however, indicating that exposure in a depressurized cabin must be limited to less than 5-10 min. A.L.W.

**A81-47194** # **A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system (Sravnitel'nyi analiz biologicheskikh effektov elektromagnitnykh izluchenii. I - Nervnaia sistema).** V. V. Antipov, B. I. Davydov, and V. S. Tikhonchuk. *Kosmicheskie Issledovaniia,* vol. 19, July-Aug. 1981, p. 649-653. 27 refs. In Russian.

Data in the literature up to 1979 concerning the effects of nonionizing electromagnetic radiation on the nervous system is reviewed. Results obtained in clinical studies of workers exposed to electromagnetic radiation, particularly microwaves, in the industrial environment are considered which indicate a variety of complaints and symptoms appearing upon radiation exposure, including headaches, exhaustion, sleep disturbances, irritability and loss of memory, as well as vegetative impairments and changes in the electrical activity of the cerebral cortex. Disadvantages of the use of industrial experiments, in which radiation doses cannot be determined exactly and complicating factors may be presented, are pointed out. Results of laboratory experiments performed on humans and experimental animals are then outlined which demonstrate the high sensitivity and variability of response of the central nervous system to electromagnetic radiation, the polymorphism of changes, and the presence of a gradual decrease in reactions with decreasing dosage, and which exhibit caution in evaluating the pathological significance of the observed changes. Areas for further research on the effects of radiation flux density, exposure time and frequency and on the influence of other factors encountered in the space flight environment on nervous system reactions are indicated. A.L.W.

**A81-47383** **Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/.** I. I. Gitelson, I. A. Terskov, B. G. Kovrov, G. M. Lisovskii, F. Ia. Sidko, Iu. N. Okladnikov, I. N. Trubachev, I. M. Pankova, I. V. Gribovskaia, and G. V. Denisov (Akademiia Nauk SSSR, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-164.* 6 p.

Results of a four-month long experiment (carried out in the USSR and called BIOS-3) are presented for a closed-control ecosystem composed of humans and higher plants, with atmospheric moisture and a large part of the food being regenerated. A description of the system is presented, noting dimensions (a volume of 230 cu m, and an area of 90 sq m x 39.4 sq m) and details on the two phytotrons. Light energy is supplied by xenon lamps which imitate sunlight. Wheat is grown in the conveyor culture on a non-substrate medium, and chuffa is grown on ceramsit by the hydropone method. Conclusions are presented, including the necessity of solar energy utilization for the realization of photosynthesis in the life-support systems of space. K.S.

**A81-47384** **Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies.** E. L. Kordium, E. M. Nedukha, A. F. Popova, P. G. Sidorenko, V. M. Fomicheva, and K. M. Sytnik (Ukrainian Academy of Sciences, Institute of Botany, Kiev, Ukrainian SSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-165.* 8 p. 7 refs.

The effects of physical and dynamic space flight factors (weightlessness, magnetic fields, vibration, and acceleration) on the growth, reproduction, and structure of plant cells (algae, mosses, angiosperms, and higher plant cell cultures) are investigated by means of electron microscopy, cytophotometry, and autoradiography. Some of the results include the fact that changes in cell ultrastructure caused by vibration and acceleration were temporary and organelles of merismatic cells proved to be more sensitive to vibration than those of differentiated cells. It is concluded that many cellular and subcellular responses to space flight conditions are primarily due to weightlessness, and that many space flight biological effects are connected to the degree of complexity of the organization of the cell, and to the duration of the effects. K.S.

**A81-47385** **Advanced life support - Orbital work base.** M. A. Shuey (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-166.* 18 p. 6 refs.

A status report is presented on advanced life support technology applicable to a space station or 'orbital work base', with attention not merely to the formulation of requirements but also the identification of system elements that can be implemented with existing technology. The range of considerations presented comprises: (1) environmental control; (2) atmosphere revitalization; (3) water management; (4) waste management; (5) food service; (6) thermal control; (7) health and hygiene; (8) habitability, operations and safety; and (9) extravehicular activities. Special attention is given carbon dioxide management by means of solid amine and electrochemical processes, oxygen supply and water conservation. A series of recommendations on the most promising technologies for further research is given in conclusion. O.C.

**A81-47386** **Life support system development in West Germany.** A. I. Skoog (Dornier System GmbH, Friedrichshafen, West Germany). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-167.* 21 p.

A status report is given for spaceborne life support systems developed in Germany since the beginning of Spacelab Environmental Control and Life Support system (ECLS) studies in 1972, along with a series of terrestrial and marine CO2-absorber system offshoots. In addition to the ECLS, whose Atmosphere Revitalization Section (ARS) and Atmosphere Storage and Control Section (ASCS) are described in detail, such Spacelab follow-on developments as the 'Biorack' life science experiments life support system and closed ecological life support systems are considered. The closed ecological systems are intended for large, long mission duration space station designs that are currently at a conceptual development stage. Schematics and detailed mechanical drawings are given for major ECLS and Biorack system elements. O.C.

**A81-47387** **Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems.** G. M. Lisovskii, I. A. Terskov, I. I. Gitelson, F. Ia. Sidko, B. G. Kovrov, M. P. Shilenko, V. I. Polonskii, and S. A. Ushakova (Akademiia Nauk SSSR, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-169.* 5 p.

Experimental consideration is given to the use of such food crops as wheat, barley, carrots and beets as elements of a closed environmental system in which the 'day-night' period and illumination intensity (600-650 W/sq m) of the moon are assumed. Emphasis is put on the compatibility of the various kinds of plants with each other, with the technical facilities assumed and with man, as producers of edible biomass. Comparisons are made between biomass yields under continuous illumination and those obtained under intermittent, lunar conditions. O.C.

**A81-47388** **Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness.** A. Scano (Istituto Superiore di Educazione Fisica; Roma, Università, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-170.* 6 p.

A simple method is described to evaluate the energetic expenditure of graded muscular exercises carried out on the ground in such a way as to approximate the state of space microgravity. The consumption of O2 measured at different rates of execution is shown as well as a tentative computation of the mechanical work on the basis of the accelerations impressed alternately on the mass of the trunk and upper limbs. The practicability of the method proposed under space conditions is pointed out; it does not require any ergometer, in fact, but only the fixing of the subject's feet to the floor of the vehicle. (Author)

**A81-47389 *** **Development of an Animal Holding Facility for Space Shuttle studies.** W. E. Berry, G. H. Bowman (NASA, Ames Research Center, Life Sciences Flight Experiments Projects Office, Moffett Field, CA), R. B. Jagow, and T. M. Olcott (Lockheed Missiles and Space Co., Inc., Sunnyvale, CA). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-171.* 15 p.

The modular Research Animal Holding Facility (RAHF) developed by NASA is described. Besides providing general housing for various animal species, the RAHF is designed to minimize disturbance of the specimens caused by vehicle and mission operations. The RAHF system offers life-sustaining capabilities, such as food, water, and waste removal, as well as environmental control. Modularity of construction to accommodate a variety of small animals and associated instrumentation ensures continued use of RAHF as the sophistication of experiments increases on subsequent missions. C.R.

**A81-47390** **Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach.** P. Ascenzi, G. Amiconi (Roma, Università, Rome, Italy), and A. Scano (Istituto Superiore di Educazione Fisica, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-175.* 6 p.

A kinetic analysis is made of changes in some physiological parameters due to changes in gravitational environment, to investigate adaptation to weightlessness in Skylab flights. A single mathematical model is devised, and it is assumed that the body may undergo any kinetic process only if the process is continuously differentiable. The process is determined by several external conditions which are identified with the gravity, and experimental data are presented and compared to determine the effects of different periods of exposure to weightlessness. The data are linearized by semilogarithmic plots, and indicate that the adaptation of the body mass to weightlessness takes place in two phases characterized by half-time values of 5 and 15 days, and the adaptation phenomena related to restoration of the body mass after recovery on the earth are characterized by two phases with half-time values of 2 and 10 days. D.L.G.

**A81-47391** **Relative efficacy of the proposed Space Shuttle antimotion sickness medications.** J. R. Horcinsky, J. Beier, E. Schwartz, and J. Martin (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-177.* 31 p. 13 refs.

The relative efficacies and side effects of treatments to be used to prevent and ameliorate space motion sickness on Space Shuttle flights are investigated. Nine subjects who had displayed sensitivity to motion sickness in preliminary tests were given transdermal injections of scopolamine, intramuscular injections of promethazine and oral doses of scopolamine-dextroamphetamine and promethazine-ephedrine combinations in a double-blind experiment employing standardized head movements during acceleration at a rate of 0.2 deg/sec per sec to a maximum rotation of 240 deg/sec, with an intermediate plateau of 10 min at 180 deg/sec. Visual tests, objective psychological tests and tilt table orthostatic response tests were also performed to assess other system influences of the drugs. The promethazine-ephidrine combination is found to produce the most drastic side effects and mood changes, producing sleepiness, dizziness and subjective vision difficulty. No significant decrements in the psychological performance were obtained with transdermal scopolamine or scopolamine-dextroamphetamine, although transient hyperactivity changing to fatigue and light depression was observed with the latter. The intramuscular injection was found to lead to marked absolute performance decrements, extreme fatigue, and resignation. It is noted that the transdermal scopolamine provided an adequate anti-motion-sickness effectiveness associated with the least significant side effects, although no more than one day's use may as yet be recommended for prophylaxis. A.L.W.

**A81-47392** **Antiorthostatic hypokinesia as a means of simulating weightlessness.** Y. G. Zorbas and S. Shoja. *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-178.* 6 p. 15 refs.

In simulating acute weightlessness, the physiological effects of seven days of clinostatic hypokinesia (CSHK) and antiorthostatic hypokinesia (AOHK) were investigated on 12 physically healthy men from 18 to 23 years of age. They were divided into four groups with three men in each: the first group of men subjected to CSHK (zero deg); the second, third and fourth groups were submitted to AOHK tilting at -4, -8 and -12 deg, respectively. An ordinary diet and unrestricted amount of fluid was provided. Postural equilibrium state of men, their reactions to orthostatic tests, ergometric tests, with measured physical training (PT) of 600 kg-m/min, heart rate, arterial pressure, oxygen uptake (OU) and the amount of oxygen utilized by the body with maximum load per systolic volume (OU/SV) were determined. It was established that AOHK at angles of -4 and -12 deg simulated much better physiological effects of actual weightlessness than CSHK. It can be concluded that AOHK makes it possible to simulate man's acute adaptational reactions to weightlessness. (Author)

**A81-47393** **Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos'.** L. Macho, S. Nemeth, R. Kvetnansky, M. Fickova (Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia), and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-179.* 10 p. 20 refs.

The effects of space flight conditions on enzymes involved in amino acid metabolism and on lipolytic processes are investigated. Enzyme activities and lypolytic responses were determined in adult male rats flown on the Cosmos 1129 biosatellite for 18.5 days immediately following landing and after a recovery period of six days, and compared with those of animals subjected to simulated space flight conditions (except weightlessness) and controls. Increases in plasma corticosterone levels and the activities of enzymes with a rapid response to glucocorticoids (tyrosine aminotransferase, tryptophan pyrrolase, serine dehydratase) and with a response to chronic corticosterone levels (alanine aminotransferase, aspartate aminotransferase) were found in the flight animals following flight, suggesting the presence of acute-stress- and chronic-stress-induced hypercorticosteronemia. Plasma corticosterone levels and enzyme activities were observed to return to control levels following the recovery period. No changes in basal lipolysis were observed in the flight rats, however both the flight rats and the ground simulation controls exhibited a lower sensitivity to lipolysis stimulation by norepinephrine both directly after the flight and following recovery. A.L.W.

**A81-47394 *** **Space Shuttle life support systems - A status report.** M. A. Faget and W. W. Guy (NASA, Johnson Space Center Engineering and Development Directorate, Houston, TX). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-181*. 50 p.

The Space Shuttle Program has two independent life support systems. One provides the basic environmental control for the Orbiter cabin while the second enables the crewmen to function outside the spacecraft for extravehicular operation. Although both of these systems were developed and fabricated under contract to NASA, all system-level testing was conducted at the Johnson Space Center. The paper will discuss the results of this testing which, in part, includes: (1) certification of the Orbiter cabin atmospheric pressure and composition control system at three operational pressures (8 psia, 9 psia and 14.7 psia); (2) certification of the Orbiter atmospheric revitalization system at 9 psia and 14.7 psia; (3) manrating of the Orbiter airlock at 14.7 psia, 9 psia and vacuum; and (4) certification of the space suit/life support system in the airlock and at deep space thermal/vacuum conditions. In addition, pertinent flight information from the on-orbit performance of the Shuttle life support systems will be presented. (Author)

**A81-47424** **Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future.** G. Rotondo (Aeronautica Militare, Servizio di Sanità, Rome, Italy), C. A. Ramacci (Scuola Militare di Sanità Aeronautica, Rome, Italy), G. Meineri, F. Monesi (Aeronautica Militare, Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), and G. C. Modugno (Roma, Università, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-250*. 9 p. 16 refs.

The physiological and functional selection procedures employed in the selection of Italian Spacelab payload specialist candidates are discussed. Following a brief review of preliminary investigations of human cpacities under conditions of weightlessness, attention is given to the physiological tests performed on those candidates who had passed a preliminary medical screening. The tests included a treadmill exercise test, and two acceleration tests designed to measure the tolerance of the 24 candidates (including two women) to vertical accelerations of up to 3 G for 10 minutes using electrocardiography and the critical flicker fusion test. The changes observed in critical flicker fusion frequency and heart rate were observed to correlate with subject fitness or unfitness, with critical flicker fusion being an earlier indicator. The need for the continuing development of selection criteria for scientific space personnel and neutrophysiological and psychological selection methods is pointed out. A.L.W.

**A81-47427** **On increasing reliability of cosmonaut-operator's activity.** N. V. Krylova and A. K. Bokovikov (Academy of Sciences of the USSR, Institute of Psychology, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-255*. 6 p. 7 refs.

A technique is suggested which may be used to improve cosmonaut operator reliability in the performance of on-board tasks. The technique is designated operator reporting (OR) and consists of specially organized verbal communication which serves to maintain operator activity and provide a means of performance evaluation. Principles have been formulated concerning the organization of OR which ensure its relationship with the task involved, uniform usage and training in the techniques. Experimental studies with two-dimensional tracking tasks have demonstrated the effectiveness of OR in improving performance in the most complex control tasks. Requirements for the structure of OR have been derived from experimental studies which concern the informational content of the speech and its structural correlation with the optimum OR scheme. The technique may thus be used to achieve a fuller utilization of human activities to improve the operational reliability of the operator-spacecraft system. A.L.W.

**A81-47447 *** **Recent progress in exobiology and planetary biology.** T. H. Jukes (California, University, Berkeley, CA). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-308*. 12 p. 23 refs. Grant No. NGR-05-003-460.

Recent work in the fields of exobiology, the study of the possible characteristics of extraterrestrial life, and planetary biology, the study of life forms as a function of planetary conditions, is reviewed. Searches conducted for life on Mars by the Viking Landers and on Titan by Voyager 1 are considered, and the origin of life on earth is considered in relation to the question of the inorganic trace elements in living systems that are required for life. The question of the origin of terrestrial life from spores carried through the interstellar medium is examined, and the unlikelihood of the survival of such spores except within meteorites or dust particles is pointed out. Studies of organic molecules present in the interstellar medium are indicated as evidence that the conditions necessary for the formation of life can exist in various locations throughout the universe. Investigations of the molecular evolution of life on earth and of life under extreme conditions of heat, cold, drought and ultraviolet radiation, and of the organic compounds found in meteorites and comets are also discussed. The importance of a mechanism of heredity, such as terrestrial DNA, to the evolution of terrestrial and possible extraterrestrial life is pointed out. A.L.W.

**A81-47574 #** **Biological flows (Biologische Strömungen).** A. Naumann. *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, Aachen, West Germany, May 11-14, 1981, Paper 81-001*. 12 p. 37 refs. In German.

The importance of flow processes for the human body is considered, taking into account the blood circulation, respiration activities, and the secretion of urine. A survey is provided of investigations conducted at the Aerodynamical Institute of Aachen University, and the effect of shear stress on the blood cells is discussed. The critical shear stress which causes damage to the cells depends on the time during which the cells are subjected to the shear stress and on the form of the pulse wave. Hemolysis and thrombosis are the most important symptoms in case of a critical narrowing of the vessels through which the blood passes. Flow studies conducted in connection with the development of a blood pump are also discussed. G.R.

**A81-47665** **Moving and the motion after-effect.** L. R. Harris, M. J. Morgan, and A. W. Still (Durham, University, Durham, England). *Nature*, vol. 293, Sept. 10, 1981, p. 139-141. Medical Research Council Grant No. G-977/865/N.

The role of observer motion in the occurrence of the movement after-effect is investigated in relation to the hypothesis that the after-effect represents a recalibration of the relationship between optical and other information. In the experiment, both the observer and the display showing centrifugal or centripetal motion were mounted on a trolley that was moved backwards and forwards. Subject responses, monitored by the method of cancellation, revealed a very small motion after-effect after viewing an expanding pattern during forward motion in contrast to larger after-effects found in the three other possible combinations of pattern and observer motion. The results do not entirely conform to the hypothesis of recalibration, as the expected enhancement of the effect under conditions of incompatible self motion and the suppression of the effect of a contracting pattern during backward self motion are not observed, although a clear influence of self motion on the visual after-effect is demonstrated. A.L.W.

**A81-47672** **Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts.** R. J.

Peterka (Eye and Ear Hospital, Pittsburgh, PA). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Sept. 1981, p. 624-630. 13 refs.

Previous methods for the determination of the orientation of the preferred response axis of individual afferent neurons innervating the otolith organs have required the rotation of an animal through a full 360 deg about its pitch and roll axes while maintaining a microelectrode recording of a single neuron. The present paper presents a more practical method for the determination of the polarization vector, sensitivity and zero-force discharge rate of a neuron from data collected during small-amplitude sinusoidal roll and pitch tilts. The method is derived from an expression relating the neuronal discharge rate to the effective force experienced by the otolith in terms of the polarization vector, and may be used for both tonic afferents, in which frequency-dependent dynamic effects are small, and phasic afferents, although a modification taking into account dynamic properties is preferable in the latter case. Results of simulations of otolith afferent responses are presented which demonstrate the accuracy of the method in identifying tonic otolith afferent response parameters and the effects of phasic otolith properties. A.L.W.

**A81-47673** **Algorithms for the clinical analysis of nystagmus eye movements.** C. Wall, III and F. O. Black (Eye and Ear Hospital, Pittsburgh, PA). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Sept. 1981, p. 638-646. 20 refs.

Two algorithms used in the clinical analysis of nystagmus are described. Their development was necessitated by the greater complexity of the nystagmus waveforms in response to system identification types of vestibular and optokinetic stimuli as compared to the less complex response to a step input. Practical considerations for clinical application also influenced their development. The first algorithm converts nystagmus data into a regularly sampled estimate of slow phase velocity (SPV), an important feature of the signal. It uses a new set of fast phase detection conditions which allow for automatic processing of reversals in nystagmus direction and for wide variability for clinical data. The second algorithm detects noise induced spikes in this SPV estimate using an adaptive criterion based upon a measure of the overall 'noisiness' of the data compared to the stimulus. (Author)

**A81-47674** **Effects of microwave irradiation on human blood platelets.** M. L. Piana (Engineering Science, Inc., Austin, TX), J. D. Hellums, and W. L. Wilson, Jr. (Rice University, Houston, TX). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Sept. 1981, p. 661-664. 18 refs.

The response of human blood platelet functions to microwave irradiation is investigated. Platelets were exposed to continuous radiation at 2.45 GHz and 40 mW/sq cm in citrate-anticoagulated platelet-rich plasma for up to 2 h, and platelet aggregation, lysis, membrane permeability, release reaction stimulation and ADP aggregration response properties were determined and compared to those of block-heated and nonheated controls. No significant changes in lysis or permeability are found in the irradiated or control platelets, while both microwave irradiation and heating are found to stimulate serotonin release, induce aggregation, and impair platelet aggregation function. It is thus concluded that the effects of microwave irradiation on human blood platelet functions are entirely thermal in nature. A.L.W.

**A81-47675 *** **A new CT collimator for producing two simultaneous overlapping slices from one scan.** Y. S. Kwoh, W. V. Glenn, Jr. (Long Beach, Memorial Hospital Medical Center, Long Beach, CA), I. S. Reed (Southern California, University, Los Angeles, CA), and T. K. Truong (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Sept. 1981, p. 664-667. Research supported by the Children and Memorial Research Foundation; Grant No. AF-AFOSR-80-0151; Contract No. NAS7-100.

A new CT collimator is developed which is capable of producing two simultaneous successive overlapping images from a single scan. The collimator represents a modification of the standard EMI 5005 collimator achieved by alternately masking one end or portions of both ends of the X-ray detectors at a 13-mm beamwidth so that a set of 540 filtered projections is obtained for each scan which can be separated into two sets of interleaved projections corresponding to views 3 mm apart. Tests have demonstrated that the quality of the images produced from these two projections almost equals the quality of those produced by the standard collimator from two separate scans. The new collimator may thus be used to achieve a speed improvement in the generation of overlapping sections as well as a reduction in X-ray dosage. A.L.W.

**A81-47847 *** **The use of ultrasonic spectroscopy to characterize calcified lesions.** J. A. Rooney (Maine, University, Orono, ME), P. M. Gammell (California Institute of Technology, Jet Propulsion Laboratory, Pasadena; Southern California, University, Los Angeles, CA), J. D. Hestenes (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), H. P. Chin, and D. H. Blankenhorn (Southern California, University, Los Angeles, CA). *IEEE Transactions on Sonics and Ultrasonics,* vol. SU-28, Sept. 1981, p. 291-297. 14 refs. NASA-supported research; Grant No. NIH-N01-HV-7-2930.

A quantitative basis is developed for the medical application of ultrasonic spectroscopy, particularly in the characterization of calcified lesions associated with atherosclerotic conditions. A theory of the field radiation patterns of disk and ring sources is presented which can be used to predict minima in the reflection spectra of a target as a function of frequency and angle relative to the acoustic axis. The theory is then tested experimentally for objects of known geometry by the use of a time delay spectroscopy system using a swept frequency technique, and results are obtained which demonstrate the usefulness of the technique. Finally, the theory is verified in the determination of lesion diameter and orientation from spectra received from calcified lesions on in vitro arterial specimens as a function of angle. A.L.W.

**A81-47894 * #** **Scaling of metabolic rate on body mass in small laboratory mammals.** N. Pace, D. F. Rahlmann, and A. H. Smith (California, University, Berkeley, CA). *International Union of Physiological Sciences, International Congress of Physiological Sciences and International Exhibition of Medical Instruments, 28th, Budapest, Hungary, July 13-19, 1980, Paper.* 5 p. 5 refs. Grant No. NsG-7336.

The scaling of metabolic heat production rate on body mass is investigated for five species of small laboratory mammal in order to define selection of animals of metabolic rates and size range appropriate for the measurement of changes in the scaling relationship upon exposure to weightlessness in Shuttle/Spacelab experiment. Metabolic rates were measured according to oxygen consumption and carbon dioxide production for individual male and female Swiss-Webster mice, Syrian hamsters, Simonsen albino rats, Hartley guinea pigs and New Zealand white rabbits, which range in mass from 0.05 to 5 kg mature body size, at ages of 1, 2, 3, 5, 8, 12, 18 and 24 months. The metabolic intensity, defined as the heat produced per hour per kg body mass, is found to decrease dramatically with age until the animals are 6 to 8 months old, with little or no sex difference. When plotted on a logarithmic graph, the relation of metabolic rate to total body mass is found to obey a power law of index 0.676, which differs significantly from the classical value of 0.75. When the values for the mice are removed, however, an index of 0.749 is obtained. It is thus proposed that six male animals, 8 months of age, of each of the four remaining species be used to study the effects of gravitational loading on the metabolic energy requirements of terrestrial animals. A.L.W.

**A81-47982 #** **The application of robotic sensors - A survey and assessment.** W. H. Boykin and R. G. Diaz (Florida, University, Gainesville, FL). In: Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 160-165. 48 refs. Contract No. ER-78-S-05-6102.

Sensor applicable to general purpose robotic manipulators were surveyed and assessed. Computized literature searches aided the survey. The assessment classified the sensors according to the basic wave length or physical spectrum: photoreceptors, mechanoreceptors, chemoreceptors, thermoreceptors and electromagnetic receptors. Sensors were also classified as imaging and nonimaging. Imaging sensors are further classified as video and others. Among the major conclusions is the finding that although significant research has been done across the sensor spectrum, little integrated sensor work has been performed and even less of the sensor work has been in maturing the technology for production. (Author)

**A81-47986 * #** **Kinesthetic coupling between operator and remote manipulator.** A. K. Bejczy (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and J. K. Salisbury, Jr. (Stanford University, Stanford, CA). In: Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 197-211. 12 refs. Contract No. NAS7-100.

A universal force-reflecting hand controller has been developed which allows the establishment of a kinesthetic coupling between the operator and a remote manipulator. The six-degree-of-freedom controller was designed to generate forces and torques on its three positional and three rotational axes in order to permit the operator to accurately feel the forces encountered by the manipulator and be as transparent to operate as possible. The universal controller has been used in an application involving a six-degree-of-freedom mechanical arm equipped with a six-dimensional force-torque sensor at its base. In this application, the hand controller acts as a position control input device to the arm, while forces and torques sensed at the base of the mechanical hand back drive the hand controller. The positional control relation and the back driving of the controller according to inputs experienced by the force-torque sensor are established through complex mathematical transformations performed by a minicomputer. The hand controller is intended as a development tool for investigating force-reflecting master-slave manipulator control technology. A.L.W.

**A81-47988 #** **Robotic actuators - A technology assessment.** R. G. Diaz and W. H. Boykin, Jr. (Florida, University, Gainesville, FL). In: Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 225-232. 32 refs. Contract No. ER-78-S-05-6102.

Robotic technology is comprised of many component technologies. Actuator technology is one of the least formally understood. Robotic actuators produce the forces used to affect tasks in the work scene and in teleoperators provide force feedback to operators. Robotic actuator technology was assessed by: considering basic actuator technology, developing design criteria and performance parameters for optimal actuators, comparing actuators considered, relative to the parameters and finally identifying promising new concepts and developments in the technology. The complete set of conclusions presented demonstrates that actuator technology is a fundamental component of robotic technology; one which offers tremendous potential for development. (Author)

**A81-47990 #** **A novel design for a robot arm.** E. F. Fichter and E. D. McDowell (Oregon State University, Corvallis, OR). In: Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 250-256. 6 refs. Research supported by the Oregon State University.

An alternative to the conventional open kinematic chain design of a robot arm is discussed. Advantages of the traditional anthropomorphic design with respect to reach, range of motion and capability of entering a small hole and disadvantages with respect to cantilever structure and kinematic indeterminacy are pointed out and compared with those of a robot arm based on a closed kinematic chain, which eliminates the problems caused by kinematic indeterminacy and is rigidly supported but is limited in reach and range of motion. The Stewart Platform is then introduced as an example of a three-dimensional closed-chain manipulator mechanism, which is based on an octahedral geometry with a rigid base and platform capable of assuming any position and orientation within a limited volume of space. Control involves the verification that the desired position is within the range of feasibility and the determination of the proper lengths of the six legs supporting the platform. Applications for a manipulator device based on the Stewart Platform exist in material handling, assembly and shaping and coating tasks and in tasks where rotational motion is more important than translational motion. A.L.W.

**A81-48006 *** **A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task.** B. T. McKissick, B. R. Ashworth, R. V. Parrish (NASA, Langley Research Center, Hampton, VA), and D. J. Martin, Jr. (Sperry Support Services, Hampton, VA). In: Annual Simulation Symposium, 13th, Tampa, FL, March 19-21, 1980, Record of Proceedings. Tampa, FL, Annual Simulation Symposium, 1980, p. 227-246. 9 refs.

NASA's Langley Research Center conducted a simulation experiment to ascertain the comparative effects of motion cues (combinations of platform motion and g-seat normal acceleration cues) on compensatory tracking performance. In the experiment, a full six-degree-of-freedom YF-16 model was used as the simulated pursuit aircraft. The Langley Visual Motion Simulator (with in-house developed wash-out), and a Langley developed g-seat were principal components of the simulation. The results of the experiment were examined utilizing univariate and multivariate techniques. The statistical analyses demonstrate that the platform motion and g-seat cues provide additional information to the pilot that allows substantial reduction of lateral tracking error. Also, the analyses show that the g-seat cue helps reduce vertical error. (Author)

**A81-48056 *** **Effects of ethidium bromide on development and aging of Drosophila - Implications for the free radical theory of aging.** J. E. Fleming, H. A. Leon, and J. Miquel (NASA, Ames Research Center, Biomedical Div., Moffett Field, CA). *Experimental Gerontology*, vol. 16, no. 3, 1981, p. 287-293. 18 refs.

**A81-48074** **Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia.** T. S. Johnson, J. B. Young, and L. Landsberg (Beth Israel Hospital; Harvard University, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Sept. 981, p. 614-620. 26 refs. Research supported by the Beth Israel Hospital; Grants No. PHS-AM-20378; No. PHS-RR-01302.

Sympathetic nervous system activity in the lung during cold exposure and hypoxia is investigated by the monitoring of norepinephrine turnover in rat lung. Following preliminary validation studies of the measurement of tritiated norepinephrine turnover as an indicator of sympathetic activity, norepinephrine turnover rate was measured in the lungs of rats exposed to hypobaric hypoxia at a simulated altitude of 5500 m for seven days, or a temperature of 4 C in a cold room for 24 hours. Results demonstrate that the labeled norepinephrine injected into the rats is taken up by the sympathetic nerve endings, stored within the pool of endogenous norepinephrine and released in response to sympathetic nerve impulses. Norepinephrine turnover rates are observed to increase in response to both chronic hypoxia and cold exposure, thus indicating an increase in sympathetic activity. A.L.W.

**A81-48075** **Osmoregulation and interstitial fluid pressure changes in humans during water immersion.** S. S. Khosla and A. B. DuBois (John B. Pierce Foundation Laboratory, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Sept. 1981, p. 686-692. 28 refs. Grants No. NIH-RR-125; No. NIH-HL-17407.

The mechanisms of the observed fluid shifts and intracellular osmoregulatory changes accompanying diuresis upon water immersion in man are investigated. Urinary and plasma electrolyte concentrations, plasma amino acid concentrations and interstitial fluid pressures were measured in subjects before, during and after immersion in 34 C water up to their necks for 1 hour. In experiments where vasopressin was administered prior to immersion, urinary sodium, potassium and osmolal clearances are found to increase significantly during immersion, accompanied by decreases in hematocrit, plasma sodium, chloride and potassium concentrations, osmolality and proteins and increases in total plasma CO2 content, threonine, proline, methionine and alanine, plasma volume and red blood cell volume. In experiments without vasopressin injection, interstitial fluid pressure is observed to decrease on the average by up to 2.10 cm H2O during immersion. It is concluded that hyposmotic fluid is mobilized into the blood from interstitial and other extravascular spaces, probably including intracellular volumes, during immersion. A.L.W.

**A81-48119** **The evolutionary development of vertebrate thermoregulation.** L. I. Crawshaw (Portland State University, Portland, OR), B. P. Moffitt (Lehman College, Bronx, NY), J. A. Downey (Columbia University, New York, NY), and D. E. Lemons. *American Scientist*, vol. 69, Sept.-Oct. 1981, p. 543-550. 44 refs.

Evidence is presented in support of the thesis that although the basic organization of the vertebrate thermostat has evolved over as much as 500 million years, it has served the vertebrate classes in a way that is dependent on two distinct factors: (1) whether the respiratory medium is air or water; and (2) whether the body temperature varies passively with thermal conditions or is maintained at a constant level by the expenditure of stored fluid and energy. Attention is given the behavioral and autonomic responses of water breathers, thermoregulation in such cold-blooded air breathers as reptiles and amphibians, and the human thermoregulatory processes of blood flow variation between hot and cold environments, sweating and shivering, and the thermoregulatory perturbations during menopause called 'hot flashes'. O.C.

**A81-48189** # **Experimental studies on the estimation of the dynamic characteristics of the human operator.** Y. Oka, T. Takeda, and M. Naito. *Hokkaido University, Faculty of Engineering, Bulletin*, July 1981, p. 141-151. 5 refs. In Japanese, with abstract in English.

The dynamic characteristics of human operators are discussed in terms of an autoregression model for several simple manual control systems. The control tasks considered include: pursuit tracking, compensatory tracking, and two-variable compensatory tracking. The dynamic behavior of the human operator is described by a linear model with additional noise representing the nonlinear component. It is shown how this additional noise is whitened by the autoregression model despite the presence of a feedback loop. As a result, the variation of the dynamic characteristics of human operators is represented by discrete pulse sequences. V.L.

**A81-48225** **Efficiency of human visual signal discrimination.** A. E. Burgess (British Columbia, University, Vancouver, Canada), R. F. Wagner, R. J. Jennings (U.S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), and H. B. Barlow (Cambridge University, Cambridge, England). *Science*, vol. 214, Oct. 2, 1981, p. 93, 94. 13 refs.

The overall statistical efficiency of human subjects discriminating the amplitude of visual pattern signals added to noisy backgrounds is measured. By changing the noise amplitude, the amount of intrinsic noise can be estimated and allowed for. For a target containing a few cycles of a spatial sinusoid of about 5 cycles per degree, the overall statistical efficiency is as high as 0.7 + or - 0.07, and after correction for intrinsic noise, efficiency reaches 0.83 + or - 0.15. Such a high figure leaves little room for residual inefficiencies in the neural mechanisms that handle these patterns. (Author)

**A81-48360** **Analytic derivation of training transfer effectiveness ratios /TERs/ for new training systems.** W. V. Hagin (Seville Research Corp., Tempe, AZ). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 375, 376. 8 refs.

The task cue-commonality analysis of Caro (1970) is used to derive TER's for Navy's new Undergraduate Jet Pilot Training System. The approach involves identification of the cues required to perform a given task in the aircraft and an analytical evaluation of the degree to which that cue is provided in the simulator. The cue-commonality approach to TER generation offers a practical solution to the problem of providing the training system designer with training effectiveness estimates. V.L.

**A81-48361** * **Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator.** J. A. Houck and A. T. Markos (NASA, Langley Research Center, Hampton, VA). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 377-382. 6 refs.

This paper describes the work being done at the National Aeronautics and Space Administration's (NASA) Langley Research Center on the development of a multi-media crew-training program for the Terminal Configured Vehicle (TCV) Mission Simulator. Brief descriptions of the goals and objectives of the TCV Program and of the TCV Mission Simulator are presented. A detailed description of the training program is provided along with a description of the performance of the first group of four commercial pilots to be qualified in the TCV Mission Simulator. (Author)

**A81-48362** **Pilot performance as a function of peripheral cues and color in computer generated images.** C. L. Kraft, C. D. Anderson, and C. L. Elworth (Boeing Aerospace Co., Seattle, WA). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 383-388. Contract No. F49620-79-C-0030.

The effects of the visual field size, scene complexity, and color on flight performance has been measured in a flight simulator with a computer generated imagery system. It is found that the size of the field of view is significant in its effects on approach and landing performance in the descending turn and on the straight-in approach. Training with an unrealistically small visual simulation may result in the inculcation of poor flying practices in the student pilot, e.g. too tight turns. Greater detail in the scene and color realism are also found to be an important aid to training. V.L.

**A81-48363** **Computer controlled electronic warfare simulation for tactical operator training.** I. V. Deaton (Singer Co., Link Flight Simulation Div., Silver Spring, MD). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 439-442.

Electronic warfare (EW) plays a key role in modern warfare; operational tactics and EW systems are changed frequently as each side tries to stay a jump ahead of the other side. Proper training of EW operators prior to combat greatly increases the effectiveness of EW combat tactics and also increases the probability of survival of EW operator and platform. This paper describes the role of computer controlled EW simulation to safely train EW system operators in a cost effective manner. A radar warning receiver (RWR) is selected as a typical and important EW system and its simulation is described at the block diagram level. Hardware/software tradeoffs to provide the most effective training while still allowing the training to be quickly adapted to meet the needs of changing operational tactics and equipment are discussed. (Author)

**A81-48374** **Computer-based simulations for man-computer system design.** B. M. Crawford, W. H. Pearson, and R. F. Bachert (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 574-579. 18 refs.

Man-in-the-loop simulations to investigate human factors problems posed by man-computer interactions in proposed weapon system concepts. Two of the system contexts in which computer-based simulations have been used are command-control and digital avionics. Two command-control experiments and one cockpit design experiment will be summarized. Generic principles for user-oriented man-computer system design are also considered. (Author)

**A81-48375** **Real time simulation of OAS Phase I controls and displays.** G. P. Chubb (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) and S. Beecroft (Systems Research Laboratories, Inc., Dayton, OH). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 580-585. 8 refs.

The experience with the Strategic Avionics Crewstation Design Facility (SACDEF) demonstrates the feasibility of developing substantial in-house Air Force simulations of systems in the development stage. Here, design documentation and concepts for operational utilization receive scrutiny they might not otherwise get. Human engineering consultation furnished to the System Program Office is predicated on an understanding of crew capabilities as well as the mission and equipment. What is more important, human factors considerations are based on empirical studies of workload, and design validation is accomplished by exercising system functions against crewmembers representing the experience levels of the actual user community. C.R.

**A81-48499** **Development of a search task for the measurement of peripheral visual acuity.** L. J. Bellamy (Birmingham, University, Birmingham, England) and A. J. Courtney (University of Hong Kong, Hong Kong). *Ergonomics*, vol. 24, July 1981, p. 497-509. 29 refs. Science Research Council Grant No. GR/A/9297/9.

Experimental evidence is discussed which indicates a relationship between peripheral visual acuity and search performance. It is suggested that use of this relationship can be made in assessing the relative extent of a person's peripheral visual field (visual lobe) for target detection when visually screening individuals for industrial inspection tasks. A card sorting task involving visual search was developed which was shown to be sensitive to subject differences in search speed. Speed of search correlated significantly with visual lobe area. Subjects' foveal acuities were not significantly related to search time. Test-retest reliability for forms A and B of the card sorting task over a one-week period was r=0.81. (Author)

**A81-48500** **Variations in response to whole-body vibration - Intensity dependent effects.** D. J. Oborne, P. Boarer, and T. O. Heath (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 24, July 1981, p. 523-530. 19 refs. Research supported by the Social Science Research Council.

The effects of overall vibration intensity on human response to whole-body vibration over a given frequency range are investigated. Equal sensation contours were measured in 24 standing subjects experiencing vibrations at frequencies from 2.5 to 60 Hz at intensities of 0.5, 1.0, 2.0 or 3.5 m/sec per sec rms. The shapes of the contours generated for each of the starting intensities are found to differ significantly, with the contour becoming more quadratic rather than linear in shape as the intensity levels increase. The results support the argument that different frequency weightings should be applied in the assessment of vibration environments with different intensities, however, contradict the contour shapes suggested by the International Standards Organisation (1974). A.L.W.

**A81-48725** **Origin of life between Scylla and Charybdis.** U. Niesert, D. Harnasch (Deutsche Forschungsgemeinschaft, Zentrallaboratorium für Mutagenitätsprüfung, Freiburg im Breisgau, West Germany), and C. Bresch (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Journal of Molecular Evolution*, vol. 17, Sept. 1981, p. 348-353. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A package model of the chemical evolution of nucleotides under prebiotic conditions is analyzed with respect to the stability of packages to fluctuations in replication and fission on the one hand, and mutations on the other. In the model, packages are conceived of as small compartments in the primordial broth enclosing a few RNA molecules in varying numbers of copies and a few polypeptides, which occasionally undergo fission with a random distribution of contents to the arising daughter packages. A computer simulation of package viability as a function of parameters including the number of participating genes, and the number of replicated molecules between two package fissions is presented which was performed for probable values of the lethal and parasitic mutation rates and the accident rate. It is shown that the origin of life must have involved no more than three genes, with between 20 and 80 RNA molecules on the average replicating between each fission. A.L.W.

**A81-48869** **Space settlements - The medical perspective.** E. T. Paterson (Medical Clinic, Creston, British Columbia, Canada). *British Interplanetary Society, Journal (Space Chronicle)*, vol. 34, Oct. 1981, p. 429-434.

Following an examination of the physiological responses to weightlessness, the likely implications are considered from the point of view of many major diseases. Cardiac, respiratory, neurological, musculoskeletal, renal, reproductive, digestive, psychiatric and infectious diseases are shown to be probably strongly influenced by low, or zero, gravity. Some implications for rehabilitation are also discussed. It is concluded that major health benefits may be realized from the migration into space. (Author)

**A81-49327** **Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions.** T. Uchiyama, E. Corday, S. Meerbaum, T.-W. Lang, P. Guerret, M. Povzhitkov, and T. Peter (Cedars-Sinai Medical Center; California, University, Los Angeles, CA). *American Journal of Cardiology*, vol. 48, Oct. 1981, p. 679-689. 30 refs. Research supported by the Ahmanson Foundation, Keck Foundation, Lillian D. Truyens Foundation, and Jules Stein Foundation; Grants No. NIH-HL-17651-06; No. NIH-HL-17651-07; No. NIH-HL-14644-07.

The technique of two-dimensional echocardiography is applied to the investigation of contractile patterns of the left ventricle during cardiac arrhythmias in the closed-chest dog. Echocardiographic short- and long-axis tomographic images were obtained for seven anesthetized dogs undergoing single premature ventricular contractions induced through threshold stimulation at the apex. The cross-sectional short-axis views revealed that, compared with contraction patterns during normal sinus rhythm, premature ventricular contractions with a short coupling interval were associated with minimal differences between end-diastolic and end-systolic areas as well as distorted regional contraction, while the subsequent postextrasystolic contraction showed a pronounced reduction in end-systolic area and increase in end-diastolic area. In contrast, premature beats with relatively long coupling intervals lead to less reduction in contraction and only minor postextrasystolic potentiation. The long-axis views revealed normal contraction patterns aside from regional systolic outward bulging in the apical region for long coupling intervals, with short coupling intervals associated with a generalized derangement of ventricular wall motion during systole. It is concluded that two-dimensional echocardiography can be used to characterize both global and region left ventricular function during cardiac rhythm disturbances. A.L.W.

**A81-49328** **Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning.** G. Maurer and N. C. Nanda (Rochester, University, Rochester, NY). *American Journal of Cardiology*, vol. 48, Oct. 1981, p. 720-727. 33 refs.

The paper presents a study of the use of two-dimensional echocardiography for the prospective evaluation of ventricular asynergy immediately after treadmill stress testing and the correlation of echocardiographic findings with thallium perfusion scans. Echocardiography was performed in the left decubitus position before and immediately after graded treadmill exercise in 41 patients who subsequently underwent cardiac catheterization for suspected coronary artery disease. Exercise-induced wall motion abnormalities were detected in 19 of the 23 patients with significant coronary artery disease and no prior history of myocardial infarction, and in all five of the patients with known previous infarction. Exercise-induced myocardial perfusion defects were found to be well correlated with exercise-induced asynergy detected by echocardiography. It is concluded that two-dimensional echocardiography performed immediately after treadmill exercise is a valuable technique in the assessment of both left and right ventricular wall motion abnormalities, with results comparable with those of thallium scanning in the evaluation of coronary artery disease. A.L.W.

**A81-49474** # **The pharmocological analysis of the stress mechanism and its consequences (Farmakologicheskii analiz mekhanizka stressa i ego posledstvii).** I. S. Zavodskaia and E. V. Moreva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). Leningrad, Izdatel'stvo Meditsina, 1981. 216 p. 245 refs. In Russian.

The pharmocological aspects of neurogenic damage to the internal organs under conditions of extreme nervous system stimulation are examined. Results are presented of observations on the intracellular, cellular, organ and system levels of damage to the digestive system, cardiovascular system, liver, and lungs induced by excessive nervous stimulation in experimental and clinical situations. The applicability of various pharmacological preparations of these conditions is considered, with particular attention given to the neurotropic substances. A.L.W.

**A81-49673** **Cues reduce direction uncertainty and enhance motion detection.** K. Ball and R. Sekuler (Northwestern University, Evanston, IL). *Perception and Psychophysics*, vol. 30, no. 2, Aug. 1981, p. 119-128. 13 refs. Grant No. AF-AFOSR-79-0064.

Previous work has shown that detectability of motion is better when the observer knows ahead of time the direction of that motion (certainty) than when he does not know the direction (uncertainty). Attempts to reduce this performance decrement associated with direction uncertainty are now reported. In these experiments, a briefly flashed, oriented line cued the observer to the direction of motion that might occur. When the cue appeared before the moving target, detectability increased; when the cue appeared after the moving target, performance dropped below that for no cue at all. In addition, the effect of cue reliability was examined by varying the relation between cue orientation and actual direction of target motion. The more accurate the cue is, the larger the performance increment. When the cue indicated a direction more than 90 deg from the actual target direction, performance was worse than when there was no cue. Results are discussed with regard to the feasibility of reducing uncertainty in real-world situations. (Author)

**A81-49885** **Systems engineering models of human-machine interaction.** W. B. Rouse (Illinois, University, Urbana, IL). New York and Amsterdam, North Holland (North Holland Series in System Science and Engineering. Volume 6), 1980. 162 p. 150 refs. $29.95.

The book treats various types of mathematical models allowing the prediction of human-machine system performances. Methodologies and applications in such fields as aircraft piloting, air traffic control, industrial process monitoring and control, failure detection and diagnosis and text editing are examined for the modeling approaches of estimation theory, control theory, queueing theory and fuzzy set theory. Consideration is also given to the less widely applicable rule-based production system models, pattern recognition concepts and Markov chain models. A.L.W.

**A81-49917** **Geomagnetic field - Its role in the evolution of life and intelligence on earth.** U. R. Rao (Indian Space Research Organization, Satellite Centre, Bangalore, India). *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Nov. 1981, p. 459-465. 35 refs. Research supported by the Department of Space and Space Commission.

The hypothesis that the fundamental cause responsible for the formation of the ozone layer on earth is the dipole magnetic field of the earth is elaborated on and supportive quantitative estimates are presented to show that the magnetic property of the earth is responsible for the sustenance of a steady ozone blanket in the earth's atmosphere, which in turn has been the major factor in the evolution of life with an oxygen metabolism. The effects of the ozone layer on the development of the earth's climate are discussed, and it is concluded that if the earth were devoid of the ozone layer, its overall surface temperature would have become as low as 1.5 K, the correlation between glacial changes and solar activity confirming this hypothesis. The constraint of the necessity of having a magnetic field for the evolution of life with an oxygen metabolism and intelligence is taken into consideration, and it is proposed that Drake's equation, which governs the calculation of the probability for finding intelligence elsewhere in the Universe, is reduced by about a factor of 10. K.S.

**A81-49918** **Medical considerations for manned interstellar flight.** J. R. Murphy. *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Nov. 1981, p. 466-476. 60 refs.

Medical effects of prolonged space flight, with respect to interstellar flight, are reviewed, dividing the discussion into two broad categories, i.e., the effects of weightlessness and those of spacecraft and space environments. Topics included in the first category of effects are: musculo-skeletal deconditioning and cardiovascular deconditioning. The second category includes the following topics: (1) effects, prevention, and treatment of human exposure to radiation in space (with attention given to sources of radiation, methods of shielding, and pharmacological methods of radiation-protection), and (2) factors increasing crew members' susceptibility to infection (with attention given to microbial contamination of the spacecraft, decreased resistance of the crew to infection, and increased microorganism mutation rate). Other topics discussed are: disturbances of biorhythms, sensory disturbances, effects of linear and radial accelerations, and psychological and social effects of space flight. It is concluded that present knowledge of the effects of space flight on man confirms the feasibility of interstellar flight, but further investigation in earth orbit ground studies are necessary. K.S.

**A81-49951** # **A histopathological study of coronary arteries in aircrew fatalities during 1962-1978.** S. K. Adaval (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), R. N. Diwan (Air Force Central Medical Establishment, New Delhi, India), R. N. Verma (Armed Forces Medical College, Poone, India), and G. N. Kunzru. *Aviation Medicine*, vol. 25, June 1981, p. 1-6. 36 refs.

The incidence of coronary artery disease in aircrew members is evaluated on the basis of a histopathological study of accident fatalities in the period 1962-1978. Coronary artery slides available for 174 aircrew autopsies were examined and compared with those taken from 105 autopsies performed on nonaircrew personnel of the same age groups who had died with no evidence of atherosclerotic conditions. Microscopic disease is found in 29.3% of the aviators, aged 20-39, and 14.3% of the control group, with the incidence of the disease increasing with subject age and accumulated flight hours. A greater incidence is observed in supersonic and transonic pilots despite their lower average age than helicopter and transport pilots, which finding is attributed to the stress factors inherent in high-speed aviation. Of the three cases of aircrew with severe atherosclerotic conditions, only one is found to be possibly related to the accident. A.L.W.

**A81-49952** # **Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration.** B. R. S. Reddy, K. Rai, V. K. Gupta (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and A. K. Ali (Iraqi Air Force, Baghdad, Iraq). *Aviation Medicine*, vol. 25, June 1981, p. 7-10.

A dynamic system with multiple lights for presenting visual stimuli at graduated angles and for measuring subject response has been developed and incorporated into a human centrifuge as a convenient means of determining subject tolerances to +Gz acceleration as indicated by peripheral light loss. GRADEPS consists of eight LEDs mounted symmetrically in pairs subtending angles of 64, 60, 56 and 52 deg at eye level and connected so that only one pair is operative at a time. Light stimuli are presented at random intervals starting with the pair at 64 deg and switching to the next pair only when the subject fails to respond to the signal by pressing a microswitch. The system has been designed using TTL integrated circuits for the controlled clock, sequence generator, LED drivers' stimulus repetition control, discretizer and random switching circuit components. GRADEPS has been used to establish g thresholds at onset rates of 0.1 to 0.5 g/sec in over 100 subjects, with improved accuracy relative to conventional single-stimulus methods. A.L.W.

**A81-49953** # **Backache in helicopter pilots.** H. Malik and R. R. Kapur (Indian Air Force, Aero-Medical Training Centre, Hindan, India). *Aviation Medicine*, vol. 25, June 1981, p. 11-15. 8 refs.

Long term flying in helicopters currently in use produces backache. Attempts have been made to analyze the problem with special emphasis on helicopter seat design. Suitable human engineering aspects in terms of seat and relocation of controls have been recommended. Regular spinal exercises by aircrew have been advised. (Author)

**A81-49954** # **Aeromedical evaluation of aircrew with lower limb disabilities.** R. Singh (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *Aviation Medicine*, vol. 25, June 1981, p. 16-20. 7 refs.

The aeromedical evaluation of pilot fitness following recovery from injuries resulting in surgical or orthopedic disabilities to the lower limbs is discussed. It is noted that while a clinical assessment based on laboratory and radiological tests may be used to determine fitness to resume duties with or without restrictions, a human engineering assessment is required to indicate accurately how a particular disability will affect aircrew performance under changing leg geometries and flight profiles. The human engineering assessment includes anthropometric measurements to assess leg shortening and joint movements, cockpit trials of rudder pedal control operation, and trials in a simulated cockpit environment with a rudder pedal assembly at force maxima likely to be encountered in an emergency situation. Recommendations concerning means to improve the instrumentation, applications and usefulness of the present method of aeromedical evaluation are presented. A.L.W.

**A81-49955 # Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber.** P. Tyagi (Indian Air Force, New Delhi, India). *Aviation Medicine,* vol. 25, June 1981, p. 21-26. 9 refs.

Cardiac responses to short-term hypoxia at a simulated altitude of 15,000 ft are studied by the simultaneous recording of electrocardiograms, phonocardiograms and external carotid pulse activity. Systolic time intervals were determined by the three methods and blood pressure was monitored in seven healthy, normal male subjects exposed to ground-level conditions and 45 min of simulated high-altitude hypoxia in a decompression chamber. A rise in heart rate and decline in left ventricular ejection time (LVET) are noted immediately upon ascent to 15,000 ft, with the heart rate decreasing somewhat and the ratio of pre-ejection period (PEP) to LVET increasing after 30 min. A subsequent rise in heart rate and decrease in PEP/LVET ratio suggest a cyclic pattern in these parameters. A decrease in heart rate accompanied by an increase in PEP and the PEP/LVET ratio are observed immediately upon return to ground level, with baseline values regained after an additional 15 min. Further studies are recommended to establish the range of normal responses for the evaluation of borderline ECG abnormalities. A.L.W.

**A81-49956 # Cardiac arrhythmias in service personnel - An electrophysiologic evaluation.** M. Durairaj (Military Hospital, Poona, India), G. R. Narayanan (Command Hospital, Poona, India), G. Kuppuswamy (Armed Forces Medical College, Poona, India), and H. L. Kher. *Aviation Medicine,* vol. 25, June 1981, p. 27-30.

Experience with the electrophysiological evaluation of military personnel with cardiac arrhythmias using the electrode catheter technique is presented. His bundle electrograms and atrial pacing were performed in 50 subjects including 14 normal controls and 36 subjects with various types of cardiac arrhythmias. In the 15 patients with sick sinus syndrome, intracardial electrocardiography revealed corrected sinus node recovery times of above 600 msec in all cases and associated A-V node disease manifested by a prolonged A-H interval in four patients. Very short resting H-V intervals were observed in the eight cases of WPW syndrome. The electrophysiological studies revealed complete heart block in two subjects with A-V block, indicating the need for permanent pacemaker therapy. His bundle and atrial tachypacing did not show any H-V prolongation in three cases of right bundle branch block with left axis deviation, indicating that pacing could be avoided. The correct diagnosis of supraventricular ectopics with wide QRS complex was also made. Results demonstrate the usefulness of electrophysiological studies in the diagnosis of conditions which may not be distinguishable by surface electrocardiography. A.L.W.

**A81-49957 # Physiological aspects of heat exposure as applied to flying.** M. L. Wadhawan. *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine,* vol. 25, June 1981, p. 34, 35.

Physiological responses to heat stress as encountered in an aircraft cockpit during low-level high-speed flight at high ambient temperatures are discussed. Human thermoregulatory pathways are considered, with attention given to the cooling mechanisms of cutaneous vasodilation, circulating blood volume increase, perspiration, respiratory heat exchange and radiation, and the accompanying stresses on the cardiovascular and circulatory systems. It is noted that aircrew performance will start to deteriorate long before physiological tolerance is reached. Mechanisms of heat acclimatization are also considered. A.L.W.

**A81-49958 # Effects of thermal stress on psychological functions and performance.** J. M. Wadhawan (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine,* vol. 25, June 1981, p. 36-38.

The effects of thermal stresses as encountered in the fighter cockpit environment during a tropical summer on human psychomotor performance are considered. Possible mechanisms through which heat stress might act to affect human performance are indicated, including a rise in internal temperature increasing the rate of neural activity, and experiments with a liquid-cooled suit demonstrating the role of core temperature in determining performance speed and the role of skin temperature in determining error rate are presented. Factors which influence the level of thermal stress are pointed out, including the relative intensity of the stress, its rate of application, duration, the presence of other stresses and subject physical, mental and emotional condition. The results of experiments on temperature intervals for the response of neural activity rate, reaction time, vigilance and monitoring performance, tracking and cognitive functions to elevations in body temperature are then presented. It is concluded that although it is not necessary to eliminate completely heat-induced psychophysiological strain, cooling measures should be undertaken to limit internal heat storage to acceptable levels. A.L.W.

**A81-49959 # Evaluation of thermal strain index for assessment of tolerance to heat stress.** K. C. Sinha (Defence Institute of Physiology and Allied Sciences, Delhi, India). *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine,* vol. 25, June 1981, p. 39-42.

The development of various thermal strain indexes for the determination of human heat tolerances is examined. Direct and indirect approaches to the measurement of thermal strain as the degree of heat accumulation or loss are indicated, and the various heat strain indexes are presented, including the actual heat content, sweating rate, heart rate, mean skin temperature and oral temperature. It is pointed out that the point of convergence of mean skin temperature with oral temperature correlates very well (correlation coefficient 0.86) with tolerance time as indicated by subjective feelings and the onset of heat collapse, whereas the other known strain indices correlate less well (correlation coefficient 0.5). A.L.W.

**A81-49960 # Microenvironmental protection in military flying.** C. A. Verghese (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine,* vol. 25, June 1981, p. 43-45.

Means for the prevention of pilot performance degradation due to excessive thermal stresses encountered during low-altitude flight during the summer months at tropical locations are considered with particular attention given to a liquid-cooled suit. Possible measures to be taken to avoid heat accumulation totalling more than 100 Kcal during flight include body cooling in a cold environment and cooling by an air-ventilated suit prior to encountering thermal stresses, and short-burst cooling by dry oxygen with an air-ventilated suit during thermal stresses. The liquid-cooled suit considered has a cooling capacity of 200 Kcal and has been shown to allow only marginal heart rate changes and heat accumulation in one hour of heat exposure at 50 C DB. The refrigeration system developed for in-flight use incorporates a fiberglass container for survival aids, refrigerant ice pack, quick-release connectors and liquid circulation pump and has been found compatible with ejection procedures. A.L.W.

**A81-49961 # Field studies of heat stress in fighter operations in Assam Valley.** V. K. Gupta (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine,* vol. 25, June 1981, p. 46-48.

Results are presented of a study of thermal stresses in aircrews engaged in fighter operations under the high temperatures and high humidity conditions of the Assam Valley of India. Environmental temperatures and physiological parameters were recorded during low-level strike, medium altitude and high altitude flight profiles flown in a supersonic fighter trainer aircraft with a turbocooler system for cabin atmosphere control. In the low-level sorties, cockpit temperature was observed to rise by 3-5 C in the 15 min between cockpit entrance and takeoff, decrease by the same amount 5 min after takeoff, and increase progressively thereafter in the in-flight and post-landing phases, accompanied by subjective feelings of discomfort and sweat loss. Significant heat accumulation or sweat loss was not found in the medium- or high-altitude flights. Results point up the potential dangers of consecutive low-level missions in high-temperature, high-humidity ambient environments, especially in the absence of air-conditioned crew rooms for pilot recovery. A.L.W.

A81-49962

**A81-49962 # Thermal stress in high speed low level flying.** B. Singh (Indian Air Force, New Delhi, India). *(Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.) Aviation Medicine*, vol. 25, June 1981, p. 49, 50.

The problem of thermal stress in high-speed, low-level flight at high ambient temperatures is discussed in light of studies carried out on supersonic flight in northwest India and in Sardinia. The studies involved the measurement of cockpit air temperatures and aircrew sweat losses during the pre-flight and in-flight portions of 35-40 min sorties undertaken in fighter aircraft in the summer and winter. Results demonstrate the severity of the aircraft thermal environment in the summer even when compared to laboratory observations at higher temperatures and even in the comparatively mild summers of southern Europe. Relations between pilot mean body temperature, and cockpit temperature, cockpit temperature and sortie time, and pilot mean body temperature and sortie time are presented which allow the prediction of pilot mean body temperature during a sortie at various cockpit temperatures. It is pointed out that the only promising way of achieving a satisfactory thermal environment is by the creation of a microenvironment around the pilot by the use of a liquid-cooled suit. A.L.W.

# STAR ENTRIES

**N81-32570*#** California Univ. at Santa Barbara. Dept. of Geography.
**CREATION OF LEARNING KITS**
Douglas A. Stow, John E. Estes, and Frederick C. Mertz *In* NASA. Ames Research Center Field Study for Remote Sensing 1981 p 35-43
Avail: NTIS HC A05/MF A01 CSCL 05I

A learning kit is an essential part of any remote sensing workshop, course, or in-house training program to provide the 'hands-on' experience of working with remotely sensed imagery. This is the objective of laboratory and field exercises as well as the reason behind the production of imagery/map kits. The way in which these learning kits (containing conventional remotely sensed and collateral data products) are put together is described and some concerns that influence the creation of learning kits are discussed. These include budgetary constraints, number of imagery types, and number of collateral data types. A.R.H.

**N81-32572*#** Humboldt State Univ., Arcata, Calif. Remote Sensing Technology Transfer Project Office.
**TEACHING/LEARNING PRINCIPLES**
Donna B. Hankins and William H. Wake *In* NASA. Ames Research Center Field Study for Remote Sensing 1981 p 61-68

Avail: NTIS HC A05/MF A01 CSCL 05I

The potential remote sensing user community is enormous, and the teaching and training tasks are even larger; however, some underlying principles may be synthesized and applied at all levels from elementary school children to sophisticated and knowledgeable adults. The basic rules applying to each of the six major elements of any training course and the underlying principle involved in each rule are summarized. The six identified major elements are: (1) field sites for problems and practice; (2) lectures and inside study; (3) learning materials and resources (the kit); (4) the field experience; (5) laboratory sessions; and (6) testing and evaluation. A.R.H.

**N81-32829*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**BIOCENTRIFUGE SYSTEM CAPABLE OF EXCHANGING SPECIMEN CAGES WHILE IN OPERATIONAL MODE Patent**
Robert R. Belew, inventor (to NASA) Issued 18 Aug. 1981 10 p Filed 30 Apr. 1980 Supersedes N80-24342 (18 - 15, p 1944)
(NASA-Case-MFS-23825-1; US-Patent-4,284,034;
US-Patent-Appl-SN-145273; US-Patent-Class-119-17;
US-Patent-Class-119-18) Avail: US Patent and Trademark Office CSCL 06B

The centrifuge comprises a generally circular, rotatably mounted frame carrying a plurality of removable and replaceable cages for the animal specimens. Pairs of opposing cages may be removed from the frame while it is rotating by means of a cage exchanger which rotates concentrically within the centrifuge and the speed of which is controlled independently of the frame speed. An image rotator is provided for selective observation of the rotating animals. The system further includes a waste conveyor system, a food supply system, and a water supply system for each cage for creating a life sustaining environment so that the animals can live in the rotating centrifuge for extended periods.
Official Gazette of the U.S. Patent and Trademark Office

**N81-32830*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**US RAT EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 1129 Final Report**
Milton R. Heinrich, ed. and Kenneth A. Souza, ed. Aug. 1981 441 p refs
(NASA-TM-81289; A-8572) Avail: NTIS HC A19/MF A01 CSCL 06C

The physiological effects of an 18.5 day space flight on young male Wistar rats, on rat embryology, and on fertile quail eggs are described.

**N81-32831*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K304: STUDIES OF SPECIFIC HEPATIC ENZYMES AND LIVER CONSTITUENTS INVOLVED IN THE CONVERSION OF CARBOHYDRATES TO LIPIDS IN RATS EXPOSED TO PROLONGED SPACE FLIGHT Final Report**
S. Abraham (Children's Hospital Medical Center, Oakland, Calif.), H. P. Klein, C. Y. Lin (Children's Hospital Medical Center, Oakland, Calif.), C. Volkmann, R. A. Tigranyan (Inst. of Medical and Biological Problems, Moscow), and E. G. Vetrova (Inst. of Medical and Biological Problems, Moscow) *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 35-100 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The effects of space flight on the activities of 26 enzymes concerned with carbohydrate and lipid metabolism in hepatic tissue taken from male Wistar rats are investigated. These activities were measured in the various hepatic cell compartments, i.e., cytosol, mitochondria and microsomes. In addition, the levels of glycogen, total lipids, phospholipids, triglycerides, cholesterol, cholesterol esters, and the fatty acid composition of the rat livers were also examined and quantified. A similar group of ground-based rats treated in an identical manner served as controls. Both flight and synchronous control rats were sacrificed at three time intervals: R+0, 7-11 hours after recovery; R+6, after 6 days; R+6(S), after 6 days (having undergone 2-5 hour periods of fixed stress in a 'backupward' position on days 0, 3, 4, 5 and 6) and R+29, after 29 days post-flight. Although most of the enzyme activities and the amounts of liver constituents studied were unaffected by the period of weightlessness, some significant differences were observed. J.D.H.

**N81-32832*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K306: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS Final Report**
Thomas J. Wronski, Emily Morey-Holton, Christopher E. Cann (California Univ., San Francisco), Claude D. Arnaud (California Univ., San Francisco), David J. Baylink (American Lake Veterans Administration Medical Center, Tacoma, Wash.), Russell T. Turner (American Lake Veterans Administration Medical Center, Tacoma, Wash.), and Webster S. S. Jee (Utah Univ., Salt Lake City) *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 101-125 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The skeletal alterations induced by space flight were determined to be a reduced rate of periosteal bone formation in tibial and humeral diaphyses, a decreased trabecular bone volume, and an increased fat content of the bone marrow in the proximal tibial metaphysis. An increased incidence of arrest lines in flight animals suggested that periosteal bone formation may have ceased during space flight. Endosteal bone resorption was not affected markedly. Author

**N81-32833*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 1: EFFECTS OF WEIGHTLESSNESS ON OSTEOBLAST DIFFERENTIATION IN RAT MOLAR PERIODONTIUM Final Report**
W. Eugene Roberts (Univ. of the Pacific, San Francisco), Peter G. Mozsary (Univ. of The Pacific, San Francisco), and Emily Morey-Holton *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 127-148 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The morphometric analysis of periodontal ligament (PDL), the osteogenic interface between tooth and bone, is described. Immediately post-flight, PDL width and total cell number wer decreased. Frequency distributions of nuclear volume revealed that presumptive preosteoblasts were particularly depressed. Depleted numbers of preosteoblasts may be an important factor in the mechanism of inhibited bone formation during weightlessness. J.D.H.

**N81-32834*#** Utah Univ., Salt Lake City. Dept. of Pharmacology.

**EXPERIMENT K306: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 2: BONE ELONGATION RATE AND BONE MASS IN METAPHYSIS OF LONG BONES Final Report**

Webster S. S. Jee, D. B. Kimmel, C. Smith, and R. B. Dell *In* NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 149-175 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The proximal humeral metaphysis of rats from time periods recovery plus zero days (R+0), recovery plus six days (R+6), and recovery plus twenty nine days (R+29) was analyzed. The volume of calcified cartilage and bone in flight and synchronous controls was reduced in groups R+0 and R+6, but was normal in group R+29. The number of functional bone cells (osteoblasts and osteoclasts) was decreased in proportion to the amout of bone in the early groups, and was normal in the last group. The fatty marrow volume was increased only in flight animals of groups R+0 and R+6, but was normal in the R+29 group. Accumulation of excess fatty marrow was seen only in flight animals. The decreased amount of bone and calcified cartilage is believed to be the result of a temporarily slowed or arrested production of calcified cartilage as a substrate for bone formation. This would have resulted from slowed bone elongation during flight and synchronous control conditions. Bone elongation returned to normal by twenty nine days after return. Author

**N81-32835*#** Baylor Univ., Dallas, Tex. Dept. of Pathology.

**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 3A: TRABECULAR SPACING AND ORIENTATION IN THE LONG BONES Final Report**

M. M. Judy *In* NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 177-198 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Values of mean trabecular spacing computed from optical diffraction patterns of 1:1 X-ray micrographs of tibial metaphysis and those obtained by standard image digitization techniques show excellent agreement. Upper limits on values of mean trabecular orientation deduced from diffraction patterns and the images are also in excellent agreement. Values of the ratio of mean trabecular spatial density in a region of 300 micrometers distal to the downwardly directed convexity in the cartilage growth plate to the value adjacent to the plate determined for flight animals sacrificed at recovery were significantly smaller than values for vivarium control animals. No significant differences were found in proximal regions. No significant differences in mean trabecular orientation were detected. Decreased values of trabecular spatial density and of both obsteoblastic activity and trabecular cross-sectional area noted in collateral researches suggest decreased modeling activity under weightlessness. Author

**N81-32836*#** Baylor Univ., Dallas, Tex. Medical Center.

**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 3B: MINERALIZATION IN THE LONG BONES Final Report**

J. L. Matthews *In* NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 199-228 ref

Avail: NTIS HC A19/MF A01 CSCL 06C

Electron microscope and optical birefringent studies of growth plates and metaphyseal trabeculae are described. The type and functional state of bone cells were investigated and the zone of calcification of the cartilagenous growth plate, particularly the presence and condition of matrix vesicles, was characterized. Trabecular number, size, and orientation were assessed. Comparisons with a control group, indicating changes resulting from a zero gravity situation, are presented. J.D.H.

**N81-32837*#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Effects Branch.

**EXPERIMENT K307: VERTEBRAL BODY STRENGTH OF RAT SPINAL COLUMNS Final Report**

Leon E. Kazarian *In* NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 229-266 refs

(NASA Order A-71669-B; Contract F33615-76-C-0401; AF Proj. 7231)

Avail: NTIS HC A19/MF A01 CSCL 06C

The effects of space flight on vertebral body bone strength excised were investigated. Comparative biomechanical investigations of vertebral body strength for flight, synchronous, and vivarium rats following spacecraft recovery (R+0), at R+6 and R+29 days post flight recovery are presented. Statistical analyses are presented for the mechanical properties of stiffness, ultimate load, displacement to ultimate load, and energy to ultimate load. At R+0 all of the above properties show that the vertebral body exhibits an increasing susceptibility to fracture. The reduction of bone strength is inhomogeneous and dependent on vertebral level. The R+6 recovery data was inconclusive since it varied above and below the R+0 data. At R+29 ultimate load values showed a statistically significant increase in bone strength approaching that of the vivarium or control group. J.D.H.

**N81-32838*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**EXPERIMENT K-308: AUTOMATIC ANALYSIS OF MUSCLE FIBERS FROM RATS SUBJECTED TO SPACEFLIGHT Final Report**

Kenneth R. Castleman (Jet Propulsion Lab., Pasadena, Calif.), Luis A. Chui (Univ. of Southern California, Los Angeles), and Joseph P. VanDerMeullen *In* NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 267-278 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The morphology of histochemically prepared muscle sections from the gastrocnemius and planiaris muscles of flight and vivarium control rats was studied quantitatiely. Both fast-twitch and slow-twitch fibers were significantly smaller in flight groups than in control groups. Fibers in group 4F were somewhat larger than in 1F, presumably due to growth after recovery. Fibers in 4V were slightly larger than in 1V, presumably due to age. The slow fibers showed more spaceflight induced size loss than fast fibers, suggesting they suffered more from hypogravity. The proportion of slow fibers was also lower in the flight groups, suggesting spaceflight induced fiber type conversion from slow to fast. Author

**N81-32839*#** Washington Univ., St. Louis, Mo. Dept. of Surgery.

**EXPERIMENT K-310: THE EFFECT OF SPACEFLIGHT ON OSTEOGENESIS AND DENTINOGENESIS IN THE MANDIBLES OF RATS Final Report**

David J. Simmons, Jean E. Russell, Frank Winter, Gary D. Rosenberg (Indiana Univ.), and William V. Walker *In* NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 279-306 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Normal rates of dentinogenesis and osteogenesis in the body of the mandible were observed. The total calcium, inorganic phosphorus and hydroxyproline levels in the jaws and incisors of the flight rats were normal. Gravity density fractionation studies suggested, however, that spaceflight caused a delay in the normal maturation of bone mineral and matrix; normal values were reestablished by 6 days postflight. The teeth were spared. The circadian and ultradian patterns of dentin calcification were normal during spaceflight and recovery periods, but the enamel rhythms displayed a greater amplitude of slfur concentrations and this abnormal calcium to sulfur ratios only during exposure to zero gravity. The rat mandible and teeth do not suffer the deficits of bone formation common to weight bearing parts of the skeleton during spaceflight. The only derangements detected were in the quality of the matrix and mineral moieties. J.D.H.

**N81-32840*#** Yale Univ., New Haven, Conn. Dept. of Internal Medicine and Cell Biology.

**EXPERIMENT K-310: THE EFFECT OF SPACE FLIGHT ON OSTENOGENESIS AND DENTINOGENESIS IN THE MANDIBLE OF RATS. SUPPLEMENT 1: THE EFFECTS OF SPACE FLIGHT ON ALVEOLAR BONE MODELING AND REMODELING IN THE RAT MANDIBLE Final Report**
P. Tran Van, A. Vignery, and R. Bacon *In* NASA. Ames Research Center US Rat Expts. flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 307-324 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The histomorphometric study of alveolar bone, a non-weight-bearing bone submitted mainly to the mechanical stimulations of mastication, showed that space flight decreases the remodeling activity but does not induce a negative balance between resorption and formation. The most dramatic effect of space flight has been observed along the periosteal surface, and especially in areas not covered with masticatory muscles, where bone formation almost stopped completely during the flight period. This bone, having been submitted to the same mechanical forces in the flight animals and the controls, leads to the conclusion that factors other than mechanical loading might be involved in the decreased bone formation during flight. J.D.H.

**N81-32841*#** Bio Space, Inc., Painsville, Ohio.
**EXPERIMENT K-313: RAT AND QUAIL ONTOGENESIS Final Report**
J. Richard Keefe *In* NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 325-362 refs
Avail: NTIS HC A19/MF A01 CSCL 06C

The potential effects of spaceflight on the processes of mammalian fertilization, implantation and embryonic development are investigated. Five female and two male rats were placed together on Day 2 of the flight. By R+17, it was determined that both flight and synchronous females were not carrying normal pregnancies and three of the flight animals were laparotomized. The uterus and ovaries were processed for microscopic analyses. The two remaining flight females were allowed to recover from the exploratory operation, rebred with flight males and delivered normal litters. As a control for potential transplacental effects that might be interpreted as direct spaceflight effects, a series of fertilized Japanese quail (Coturnix japonica) eggs was flown on Cosmos 1129. Although all of the eggs were adversely impacted by an inflight failure of the incubator humidifier on flight Day 13, several embryos were able to progress to a development stage equivalent to that of a control 10-12 Day embryo. J.D.H.

**N81-32842*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K-314: FETAL AND NEONATAL RAT BONE AND JOINT DEVELOPMENT FOLLOWING IN UTERO SPACEFLIGHT Final Report**
E. E. Sabelman (California Univ., San Francisco), E. M. Holton, and C. D. Arnaud (California Univ., San Francisco) *In its* US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 363-404 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Infant rat limb specimens from Soviet and U.S. ground-based studies were examined by radiography, macrophotography, histologic sectioning and staining and scanning electron microscopy. A comparison was conducted between vivarium and flight-type diets suggesting that nutritional abesity may adversely affect pregnancy. Data were obtained on maturation of ossification centers, orientation of collagen fibers in bone, tendon and ligaments, joint surface texture and spatial relationships of bones of the hind limb. Computer reconstructions of the knee and hip show promise as a means of investigating the etiology of congenital hip dislocation. Auhor

**N81-32843*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K-315: STUDIES OF THE NASAL NUCOSA Final Report**
Lisbeth M. Kraft *In its* US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 405-414 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The posterior regions of the olfactory nasal mucosa of rats flown on Cosmos 1129 failed to reveal histopathological changes. These results are at variance with those of the Apollo 12 Biocore experiment in which severe necrotic olfactory mucosal lesions were seen in flight animals only. In the anterior aspect of the nasal cavity of the Cosmos 1129 rats, however, focal lesions of moderate severity, and variable extent were seen. These were consistent in character with that of a mild virus infection, which, it is postulated, was self-limiting. The infection was present in all groups of animals: flight, synchronous and vivarium control. Author

**N81-32844*#** Institute of Biomedical Problems, Moscow (USSR).
**EXPERIMENT K-316: EFFECTS OF WEIGHTLESSNESS ON BODY COMPOSITION IN THE RAT Final Report**
A. S. Ushakov, T. A. Smirnova, G. C. Pitts (Virginia Univ.), N. Pace (California Univ., Berkeley), and A. H. Smith (California Univ., Davis) *In* NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 415-426 refs
Avail: NTIS HC A19/MF A01 CSCL 06C

Five male rats were dissected into three major compartments (musculo-skeletal system, skin, and pooled viscera) and compared with synchronous controls. The flight group show a 6.7% reduction in total body water probably attributable to a 36.2% reduction in the extracellular compartment, reductions of 6.6% in musculo-skeletal water and 17.2% in skin water, an apparent shift of some water from skin to viscera, and a 20% reduction in bone mineral mass. Among organ fresh masses there was a 7.5% increase in kidneys and a 14.0% decrease in spleen. J.D.H.

**N81-32845*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**EXPERIMENT K-317: BONE RESORPTION IN RATS DURING SPACEFLIGHT Final Report**
Christopher E. Cann (California Univ., San Francisco) and Richard R. Adachi *In its* US Rats Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 427-438 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Direct measurement of bone resorption in flight and synchronous control rats is described. Continuous tracer administration techniques were used, with replacement of dietary calcium with isotopically enriched Ca40 and measurement by neutron activation analysis of the Ca48 released by the skeleton. There is no large change in bone resorption in rats. Based on the time course of changes, the measured 20-25% decrease in resorption is probably secondary to a decrease in total body calcium turnover. The excretion of sodium, potassium and zinc all increase during flight, sodium and potassium to a level 4-5 times control values. J.D.H.

**N81-32846#** Norwegian Defence Research Establishment, Kjeller.
**SPACECRAFT AND STELLAR OCCULTATIONS BY TURBULENT PLANETARY ATMOSPHERES. A THEORETICAL INVESTIGATION OF VARIOUS WAVE PROPAGATION EFFECTS AND THEIR IMPACT ON DERIVED PROFILES OF REFRACTIVITY, TEMPERATURE AND PRESSURE**
Bjarne Sigurd Haugstad 8 May 1981 75 p refs
(AD-A103069; NDRE/PUBL-81/1002; ISSN-0085-4301) Avail: NTIS HC A04/MF A01 CSCL 03/2

The long propagation paths involved in radio and stellar occultations by turbulent planetary atmospheres require that the classical, weak scattering scintillation theory be expanded to account for the inhomogeneous ambient atmosphere upon which the turbulence is superimposed. Such coupling between the turbulent and the ambient components of refractivity reduces the scintillation index by less than a factor of two in shallow radio occultations. For stellar occultations the reduction varies between this value for very small projected stellar radii, to approximately a factor of 3.6 when the projected stellar radius above the planetary limb greatly exceeds the radius of the free-space Fresnel zone at this distance. More profound changes are found in the scintillation power spectrum, the shape of which depends strongly on both occultation depth and geometry when coupling to the inhomogeneous background is properly accounted for. Second-order, systematic propagation effects calculated from both geometrical optics and a wave-optical formulation show that the average phase velocity is increased in the presence of turbulence. The finite wavelength dependence of the phase path bias implies that an initially non-dispersive medium becomes slightly dispersive by the addition of turbulence. Atmospheric profiles derived from occultations by turbulent planetary atmospheres differ only slightly from those of the corresponding non-turbulent atmosphere when the week scattering condition is satisfied. GRA

**N81-32847#** California Univ., Berkeley. Lawrence Berkeley Lab.

**THEORETICAL AND OBSERVATIONAL ANALYSIS OF INDIVIDUAL IONIZING PARTICLE EFFECTS IN BIOLOGICAL TISSUE**

Alan Caril Nelson Nov. 1980 164 p refs
(Contract W-7405-eng-48)
(LBL-11147-Rev) Avail: NTIS HC A08/MF A01

The microstructural damage to living tissue caused by heavy ion radiation was investigated. The corneal tissue of the living rat was exposed to various charged particle beams at different energies. X-rays were used on corneas to compare with the heavy ion irradiated corneas. The samples were subjected to graded ethanol dehydration and liquid carbon dioxide critical point drying. Scanning electron microscopy of corneal epithelium revealed heavy ion irradiation of the tissue. Lesions with circular symmetry occured on the external plasma membranes of corneal epithelium which were irradiated with heavy ions, but similar lesions were not observed on the plasma membranes of X-ray irradiated or nonirradiated control samples. DOE

**N81-32848#** California Univ., Berkeley. Lawrence Berkeley Lab. Biology and Medicine Div.

**BIOLOGICAL EFFECTS OF HIGH DC MAGNETIC FIELDS**

Tom S. Tenforde Jun. 1981 48 p
(Contract W-7405-eng-48)
(DE81-028904; LBL-12954) Avail: NTIS HC A03/MF A01

An evaluation made of magnetic field effects on a broad range of physiological functions in laboratory mammals, including the measurement of circadian rhythms using noninvasive recording techniques. Results of investigations of magnetic field effects on the conformation of DNA, and on the growth and development of plants and insects are reported. Figures and tables provide a brief summary of some representative observations in each of the research areas described. No significant alterations were observed in any of the physiological parameters examined, with the exception of major changes that occur in the electrocardiogram during magnetic field exposure. This phenomenon is attributable to electrical potentials that are induced during pulsatile blood flow in the aorta and in other major vessels of the circulatory system. DOE

**N81-32849#** Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.

**MOLECULAR BASIS OF THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION**

1981 9 p refs
(Contract DE-AS02-76EV-02814)
(DE81-028535; DOE/EV-02814/3) Avail: NTIS HC A02/MF A01

In the last few years it became increasingly apparent that the enzymatic reactions leading to the incision of ultraviolet (UV) irradiated DNA are more complicated than the original single step model suggested. There may be at least two mechanisms to account for the multigenic control of this rate-limiting process. This mechanism is examined directly in mammalian cells by genetic complementation and immunological analysis of repair deficient human cell lines derived from patients with the repair deficiency xeroderma pigmentosum. DOE

**N81-32850#** Connecticut Univ., Farmington. School of Medicine.

**TOXICOLOGY AND METABOLISM OF NICKEL COMPOUNDS** Progress Report, 1 Dec. 1980 - 30 Nov. 1981

F. William Sunderman, Jr. 31 Jul. 1981 16 p refs
(Contract DE-AS02-76EV-03140)
(DE81-028924; DOE/EV-03140/T2) Avail: NTIS HC A02/MF A01

The toxicology and metabolism of nickel compounds (e.g., NiCl2, Ni3S2 and Ni(CO)4) were investigated in rats. A provisional reference method for analysis of nickel in whole blood by electrothermal atomic absorption spectrometry was developed. Five macromolecular (63)Ni-binding constituents in rat kidney cytosol were partially characterized. A spectrophotometric assay for N-acetyl-(ALPHA)-D-glucosaminidase (NAG) activity in urine was developed, and the NAG assay was applied to investigate nickel nephropathy in rats. The time-course, dose-response, and organ specificity of Ni(II)-induction of heme oxygenase activity in rats was elucidated. Intrarenal injection of Ni3S2 in rats was demonstrated to result in renal glomerulomegaly and mesangial hyperplasia, sialyl hyperplasia, and generalized arteriosclerosis. The dissolution rates of 17 nickel compounds were determined in water, rat serum and renal cytosol. NiTc, NiSb and NiAsB were discovered to be carcinogenic following intramusclar injection in Fischer rats. Nickel concentrations were surveyed in serum and urine of workers in two shipyards. DOE

**N81-32851#** Cornell Univ., Ithaca, N. Y. Dept. of Physical Biology.

**MOLECULAR MECHANISMS OF THE EPITHELIAL TRANSPORT OF TOXIC METAL IONS, PARTICULARLY MERCURY, CADMIUM, LEAD, ARSENIC, ZINC AND COPPER** Comprehensive Progress Report, 1 Jan. 1979 - 31 Jul. 1981

Robert H. Wasserman and Curtis S. Fullmer 1981 72 p refs
(Contract DE-AS02-76EV-02792)
(DE81-029091; DOE/EV-02792/T1) Avail: NTIS HC A04/MF A01

Investigations have been continued to elucidate the mode of transepithelial transport of potentially toxic metal ions across the gastrointestinal tract, as well as their interactions with biological processes and other metal ions. Primary attention for this report period has been given to lead, cadmium and zinc. DOE

**N81-32852*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SIMULATED SPACEFLIGHT EFFECTS ON MATING AND PREGNANCY OF RATS**

Eric E. Sabelman (California Univ. at San Francisco), Peter V. Chetirkin, and Robin M. Howard Sep. 1981 44 p refs
(NASA-TM-81326; A-8461) Avail: NTIS HC A03/MF A01 CSCL 06C

The mating of rats was studied to determine the effects of: simulated reentry stresses at known stages of pregnancy, and full flight simulation, consisting of sequential launch stresses, group housing, mating opportunity, diet, simulated reentry, and postreentry isolation of male and female rats. Uterine contents, adrenal mass and abdominal fat as a proportion of body mass, duration of pregnancy, and number and sex of offspring were studied. It is found that: (1) parturition following full flight simulation was delayed relative to that of controls; (2) litter size was reduced and resorptions increased compared with previous matings in the same group of animals; and (3) abdominal fat was highly elevated in animals that were fed the Soviet paste diet. It is suggested that the combined effects of diet, stress, spacecraft environment, and weightlessness decreased the probability of mating or of viable pregnancies in the Cosmos 1129 flight and control animals. E.A.K.

**N81-32853*#** Southwest Foundation for Research and Education, San Antonio, Tex.

**EVALUATION OF THE CNS AND CARDIOVASCULAR EFFECTS OF PROLONGED EXPOSURE TO BROMOTRIFLUROMETHANE (CBrF3)** Final Technical Report, 1 Mar. 1980 - 1 May 1981

Irving Geller, Cynthia Garcia, Chester Gleiser, Richard Haines, Jr., Murray Hamilton, Roy Hartmann, Jr., Victor Mendez, Alan Samuels, and Maria San Miguel 1 May 1981 237 p refs
(NASA-CR-161078) Avail: NTIS HC A11/MF A01 CSCL 06T

The proposed use of bromotrifluoromethane (CBrF3) as a fire extinguishant in aircraft, spacecraft and submarines has stimulated increasing interest and research in the toxicological properties of this compound. In a spacecraft, because of its unique recirculating life support system, the introduction of CBrF3 by leakage or intentional discharge, will result in continuous exposure of crewman to low concentrations of this compound for periods of up to 7 days, or possibly even longer. The effects of low concentrations of CBrF3, under continuous exposure conditions, on the CNS and cardiovascular systems of animals to enable an assessment of these risks were investigated. T.M.

**N81-32854#** Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.

**COMPARATIVE STUDY OF METHODS OF IDENTIFICATION OF MODELS OF HUMAN REGULATORS [VERGLEICHENDE UNTERSUCHUNG VON IDENTIFIKATIONVERFAHREN FUER REGLER-MENSCH-MODELLE]**
Norbert Ninz 1980 209 p refs In GERMAN
(ILR-48; ISSN-0341-0587; ISBN-3-7983-0701-8) Avail: NTIS HC A10/MF A01

Various techniques applicable to the determination of the parameters of a quasi-linear system were utilized to analyze human identification processes. The techniques studied incuded the maximum likelihood estimator, the Kalman filter, and the cross-power density method. The productivity of the identification processes is addressed. Transl. by E.A.K

**N81-32855#** Battelle Pacific Northwest Labs., Richland, Wash.
**CHEMICAL CHARACTERIZATION AND TOXICOLOGIC EVALUATION OF AIRBORNE MIXTURES Final Report, 1 Oct. 1979 - 30 Jul. 1980**
John E. Ballou Apr. 1981 78 p refs
(Contract DAMD17-79-C-9160; DA Proj. 351-62780-A-843)
(AD-A102678) Avail: NTIS HC A05/MF A01 CSCL 19/1

Generators were constructed to produce both petroleum (SGF-2) and red phosphorus/butyl rubber (RP/BR) smoke aerosols. The petroleum smoke generator produced smoke concentrations of 2 to 10 mg/1 for several hours. The Battelle exposure chamber was used to expose male and female Sprague-Dawley rats to the petroleum aerosol at concentrations of 2.65 to 10.73 mg/1 for periods of 1 to 6 hours. Animal deaths occurred only in the 6 hour exposure to 10.73 mg/1. Rats were exposed to 3.15, 4.33, 5.36 and 8.46 mg/1 for 1 hour and 1.53 mg/1 for 4 hours. The 4.33 mg/1 exposure produced 50% mortality. Of the 40 animals exposed for 1 hour, 23 died within 14 days. All of these died on days 1, 2, 6, 8, 9, 10, or 11. Observed pathology, included marked erosion and edema of the laryngeal and proximal tracheal region. E.A.K.

**N81-32856#** Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
**ASSESSMENT OF HEALTH IMPACTS FROM ELECTRICAL-POWER TRANSMISSION LINES**
Morton W. Miller 1980 16 p refs
(Contract DE-AC02-76EV-03490)
(UR-3490-2024) Avail: NTIS HC A02/MF A01

The types of investigations undertaken to test for possible biological effects of extremely low frequency (ELF) electric fields were numerous. However, neither animal and plant experimentation nor clinical studies nor experience with operating extremely high voltage (EHV) transmission lines have to date provided convincing evidence of a harmful effect from exposure to electric fields associated with transmission lines in spite of numerous attempts to find such effects. Analysis of internal fields and currents supports these observations as the levels appear to be too low to affect mamalian cells. Thus, while one can never prove the negative (i.e., that there is no effect), the overwhelming body of evidence indicates that the electric fields associated with high voltage lines have no deleterious biological effects. DOE

**N81-32857#** Argonne National Lab., Ill. Div. of Biological and Medical Research.
**BIOMEDICAL EFFECTS ASSOCIATED WITH ENERGY-TRANSMISSIONS SYSTEMS: EFFECTS OF 60-Hz ELECTRIC FIELDS ON CIRCADIAN AND ULTRADIAN PHYSIOLOGICAL AND BEHAVIORAL FUNCTIONS IN SMALL RODENTS Technical Report, 1 Jan. - 31 Dec. 1980**
C. F. Ehret, R. S. Rosenberg, G. A. Sacher, P. H. Duffy, K. R. Groh, and J. J. Russell 1980 85 p refs
(Contract W-31-109-eng-38)
(DE81-027655; DOE/TIC-1027653) Avail: NTIS HC A05/MF A01

The effects of extremely low frequency (ELF) electric fields on transient patterns of circadian rhythms of physiological and behavioral end points were investigated. This project is developing a data base to determine the exposure conditions that disturb the highly characteristic waveforms of ultradian, circadian, and infradian rhythms. The following conclusions were reached: under a variety of exposure conditions the circadian regulatory system of the rat remained intact; brief ELF exposures at field strengths above 35 kV/m, presented during the inactive phase of the circadian cycle, produced a transient arousal in mice, characterized by increases in motor activity, carbon dioxide production, and oxygen consumption; the transient arousal habituated rapidly; no significant effects were seen in the second, third, or fourth exposure of mice using a one hour on, one hour off protocol; and there were no circadian aftereffects of the intermittent ELF stimulus in mice, based on measures of rhythms of activity and gas metabolisms. DOE

**N81-32858#** California Univ., Riverside. Biomedical Sciences Div.
**TISSUE INTERACTION WITH NONIONIZING ELECTROMAGNETIC FIELDS Final Report, 1 Oct. 1978 - 13 Feb. 1981**
W. R. Adey, S. M. Bawin, A. F. Lawrence, S. Lin-Liu, R. A. Luber, R. L. Lundak, P. M. Sagan, and A. R. Sheppard Feb. 1981 174 p refs Prepared in cooperation with Veterans Administration Hospital, Loma Linda, Calif.
(Contract DE-AT01-79ET-29078)
(DE81-027654; DOE/ET-29078/T1) Avail: NTIS HC A08/MF A01

Studies of the effects of environmental low frequency electromagnetic fields on isolated cellular systems and tissue preparations derived from brain, bone, blood, and pancreas are reported. Behavioral effects of 60 Hz fields were examined in monkeys. Bioeffects of low level microwave fields modulated at 60 Hz and other ELF frequencies were also examined. Findings emphasize a key role for cell membrane surfaces in detecting ELF environmental fields. DOE

**N81-32859#** Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
**THE NEURONAL POOL AS A FUNCTION UNIT IN THE CENTRAL NERVOUS SYSTEM (CNS)**
Anders Lansner 1980 34 p refs
(TRITA-NA-8009) Avail: NTIS HC A03/MF A01

The principles of information processing applied by these functional subunits are discussed starting from what is known about the properties of single neurons and synapses. The question of how quality, intensity and spatial properties of stimuli are coded in the trains of nerve impulses passed on along the nerve tracts is briefly treated. The information put into the neuronal pool via parallel nerve fibers is viewed as an input pattern. Each input pattern activates only a few of the neurons in the neuronal pool. Due to simultaneous presynaptic and postsynaptic activity these neurons become functionally connected to each other forming so called neuronal ensembles. The neuronal ensembles are postulated to make up the basic elements of activity in the neuronal pool and to influence each other mainly through parallel and serial association. Author (ESA)

**N81-32860#** Conference of Radiation Control Program Directors, Inc., Rockville, Md.
**CRITERIA FOR ADEQUATE RADIATION CONTROL PROGRAMS (X RAY): A REPORT OF TASK FORCE 2A Final Report**
Dept. of Health and Human Services Apr. 1981 20 p refs
(Contract FDA-223-79-6010)
(PB81-197881; FDA/BRH-81/58; DHHS/PUB/FDA-81-8160) Avail: NTIS HC A02/MF A01 CSCL 06R

This guide was developed by the Task Force on Criteria for Adequate Radiation Control Programs (X Ray) at the direction of the Conference of Radiation Control Program Directors. This document presents the guidance of the Task Force as a result of its research and deliberations. It presents a method for determining the quality and quantity of the human resources necessary for the successful operation of a balanced, through and yet efficient X-ray control program at the state level. This report should serve as the basis by which state radiation control agencies, legislative bodies, as well as the public can make realistic evaluations regarding the adequacy of X-ray control programs. GRA

**N81-32861#** Chinese Medical Association, Beijing.
**CHINESE MEDICAL JOURNAL. VOLUME 94, NUMBER 4, APRIL 1981**
Apr. 1981 80 p refs
(PB81-204752) Avail: NTIS HC A05/MF A01 CSCL 06E

Contents include clinical reactogenicity and immunogenicity of five live measles vaccine strains, observations on red cell membrane of paroxysmal nocturnal hemoglobinuria, congenital aneurysm of thoracic aorta radiologic pathologic study of 8 cases; seroepidemiologic study of epidemic hemorhagic fever with mal syndrome in China: diagnosis and surgical treatment of early esophageal carcinoma: a five year report on community control of hypertension, stroke and coronary heart disease in the Shijingshan People's Commune, Beijing: and a study of increased griseolulvin bioavailability with p-hydroxy acetophenone. Nonsurgical traditional Chinese medicine in extradural hematomas is described. GRA

**N81-32862#** Bureau of Radiological Health, Rockville, Md. Div. of Compliance.

**ROUTINE COMPLIANCE TESTING FOR DIAGNOSTIC X-RAY SYSTEMS**

Dec. 1980 190 p Supersedes FDA-77-8001
(PB81-201501; FDA/BRH-81/62; DHHS/PUB/FDA-81-8161; FDA-77-8001) Avail: NTIS HC A09/MF A01 CSCL 06L

Procedures for the routine compliance testing of Diagnostic X-Ray Systems were described. The manual has two major subject areas: (1) testing procedures and (2) test equipment. Procedures efficient testing against many performance requirements and applicable to many different types of X-ray systems and each component of the routine compliance test system and described. The procedures and routine test equipment were used for screening diagnostic X-ray systems for evidence of noncompliance with the performance standard. GRA

**N81-32863#** Colorado Univ. at Boulder. Inst. of Cognitive Science.

**COMPREHENSION AND ANALYSIS OF INFORMATION IN TEXT. 4: DECISION AND VERIFICATION PROCESSES Technical Report, 1 May 1980 - 26 May 1981**

Steve Antos (Ben Gurion Univ. of the Negev, Israel), Lyle E. Bourne, Jr., Ely Kozminsky (Ben Gurion Univ. of the Negev, Israel), and Walter Kintsch May 1981 54 p refs
(Contract N00014-78-C-0433; NR Proj. 157-422)
(AD-A102677; ICS-TR-104-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/10

Reading texts for the purpose of making decisions was studied in a laboratory analog of a complex, natural, information-analytic domain. Subjects acting as stock brokers were trained in the first two sessions to categorize and evaluate stock report-type information. In addition, they learned to infer information from text-explicit facts. In Session three, subjects read texts and made decisions to Buy or Not Buy based on a conjuntive rule that was either given to the subject before (RB) or after (RA) reading the text. In Session 4, subjects read texts and then were presented probes that were to be verified as to either having or not having been presented in the previously read texts. Performance in all tasks was measured in terms of response latency, as well as accuracy. The results demonstrated that a specialized control schema for text comprehension develops that is based on the nature of the decision task. For example, readers in the RA versus the RB condition develop different text analysis techniques that are apparent in the decision, as well as the verification task performance. Most of the results are interpretable in terms of a model which suggests that purposes and goals relevant to the text comprehension process are incorporated into long-term memory (i.e., knowledge structures). The integration of these knowledge structures with current short-term information provides the basis of a task-appropriate text representation. Author (GRA)

**N81-32864#** Texas Christian Univ., Fort Worth. Inst. of Behavioral Research.

**AGGREGATION BIAS IN ESTIMATES OF PERCEPTUAL AGREEMENT**

Lawrence R. James (Georgia Inst. of Technology) 1 Aug. 1981 22 p refs
(Contract N00014-80-C-0315; NR Proj. 170-904)
(AD-A102726; IBR-81-12) Avail: NTIS HC A02/MF A01 CSCL 05/1

It is shown that estimates of agreement based on group mean scores have been incorrectly interpreted as applying to perceptual agreement among individuals. Of initial importance is a study by Drexler (1977), who concluded that a considerable proportion of the variance in climate perceptions is accounted for by organizational membership. This conclusion has been employed recently by other authors to support the assumption that individuals in the same environment tend to agree with respect to climate perceptions. The present paper demonstrates that Drexler's analysis provided inflated estimates of agreement among individuals. The logic of the approach is then extended to other studies in which inflated estimates of agreement appeared likely. Author (GRA)

**N81-32865** Aeronautical Research Labs., Melbourne (Australia).

**EVALUATIONS OF A MODIFIED CREW SEAT FOR THE IROQUOIS**

B. A. J. Clark and S. R. Sarraille May 1980 42 p refs
(ARL/APP-Report-80; AR-001-815) Copyright. Avail: Issuing Activity

The aircrew of Iroquois helicopters criticized aspects of the comfort and safety provided by the crew seats and additional faults were identified in crash investigations. The complaints include: (1) lack of protection against hyperextension of the neck (whiplash) and against impact onto the shoulder strap guide at the top of the backrest; (2) discomfort and pain during and after use of the crew seats; and (3) lack of provision for occasional wearing of parachutes. Studies of a modified crew seat show that the proposed head restraint is adequately strong and should reduce the likelihood of hyperextension injury. Replacement of the net seat by a foam cushion did not give a reliable improvement in comfort, nor did it improve the crash protection. Continued use of either crew seat in the aircraft is likely to lead to chronic backache in some pilots. Further modifications are suggested. A.R.H.

**N81-32866*#** United Technologies Corp., Windsor Locks, Conn.

**EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM: PREBREATHE ELIMINATION STUDY Final Report**

Richard L. Wilde Aug. 1981 269 p refs
(Contract NAS9-15290)
(NASA-CR-167390; DRL-T-1286) Avail: NTIS HC A12/MF A01 CSCL 05H

The study examined impacts of changing Orbiter cabin pressure and EMU EVA pressure to eliminate pure O2 prebreathing prior to EVA. The investigation defines circumscribing physiological boundaries and identifies changes required within Orbiter to reduce cabin pressure. The study also identifies payload impacts, payload flight assignment constraints, and impacts upon EMU resulting from raising EVA pressure. The study presents the trade-off which optimizes the choice of reduced cabin pressure and increased EVA pressure. T.M.

**N81-32867#** Ballistic Research Labs., Aberdeen Proving Ground, Md.

**ANALYSIS OF MAN-IN-THE-LOOP CONTROL SYSTEMS IN THE PRESENCE OF NONLINEARITIES**

Robert T. Gschwind and Irving L. Chidsey Jun. 1981 45 p Supersedes ARBRL-MR-03110
(DA Proj. 1L1-61102-A-91A)
(AD-A102574; ARBRL-MR-03110) Avail: NTIS HC A03/MF A01 CSCL 05/9

The BRL and HEL are jointly investigating the effects of system nonlinearities on the accuracy of turret control systems with human operators in the loop. The system response at very low rates (one milliradian per second and less) is degraded because of the increased relative importance of nonlinear elements such as coulomb friction, backlash, and dead space. Good low rate response is necessary for accurate tracking of long range targets with laser designators and guided missile directors. This report describes the first phase of the BRL contribution to the joint project. This phase developed a simplified simulation of a turret control with a human transfer function. There is an adaptive algorithm to adjust the coefficients of the human transfer function to account for changes in the system characteristics. Backlash, coulomb friction, and dead space are introduced and their effects on system response and loop performance are documented. The next phase will adjust the simulation to agree with the system response of a concurrent turret measurement program. It will compare the loop performance to a concurrent experiment with a real man-in-the-loop. It will relate loop performance (tracking accuracy) to system response at low rates. Author (GRA)

**N81-32868#** Purdue Univ., Lafayette, Ind. Lab. for Applied Industrial Control.

**MAN-MACHINE SIMULATIONS IN INDUSTRIAL SYSTEMS. VOLUME 1: NARRATIVE M.S. Thesis**

Gary Irving Davis and James R. Buck Dec. 1980 277 p refs
(Contract DE-AS07-80CS-40361; Grant NSF APR-73-07822)
(DE81-027882; DOE/CS-40361/T6-Vol-1) Avail: NTIS HC A13/MF A01

Computer simulation is discussed and an alternative to methodologies upon relied. The development of computer simulation models suitable for representing human operators in industrial process simulations are developed and presented. Use of these models is demonstrated through the use of a particular simulation technique entitled, 'Systems Analysis of Integrated Networks of Tasks" (SAINT). This simulation pseudo-language is a combination network modeling and simulation technique designed for the analysis of man-machine systems is provided as well as a review of the literature on simulation of man-machine systems. The development of the human operator models (referred to as Smart SAINT) and their use as a design aid is described. DOE

**N81-32969*#** National Aeronautics and Space Administration, Washington, D. C. Office of Space Science.
**PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1980: A SPECIAL BIBLIOGRAPHY**
Linda G. Pleasant and Donald L. DeVincenzi Aug. 1981 36 p
(NASA-TM-83808) Avail: NTIS HC A03/MF A01 CSCL 06C

A list of approximately 160 publications resulting from research pursued under the auspices of NASA'S Exobiology Program is given. The publications address chemical evolution, organic geochemistry, origin and evolution of life, planetary environments, life in the universe, and planetary protection. M.G

**N81-33769** Materials Research Labs., Melbourne (Australia).
**A COMPARISON OF POSSIBLE METHODS FOR MARINE FOULING ASSESSMENT DURING RAFT TRIALS**
John A. Lewis Apr. 1981 27 p refs
(MRL-R-808; AR-002-406; NAV-79/137; DST-77/006) Copyright. Avail: Materials Res. Labs., P.O. Box 50, Ascot Vale, Vic. 3032

Fouling settlement data from HMAS STIRLING (Western Australia), the North Barnard Islands (North Queensland) and Williamstown (Victoria) were to evaluate the suitability of different methods for settlement. Density, cover, frequency and biomass were measured to assess the abundance of settlement on panels immersed during raft trials. Frequency was the most suitable measure of individual species abundance for comparisons. It is found that panel cover and biomass are better indices of total fouling abundance than either density or frequency. E.A.K.

**N81-33770#** Mitre Corp., McLean, Va. Metrek Div.
**EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT. DEVELOPMENT OF NEUROBEHAVIORAL BIOASSAYS IN LABORATORY ANIMALS. DIRECTORY OF INSTITUTIONS/INDIVIDUALS Final Report, Sep. 1978 - Jul. 1980**
Purna Greenaway and James Konz Oct. 1980 106 p
(Contract DAMD17-78-C-8068; DA Proj. 3E1-61102-BS-04) (AD-A104225; WP-79W00681) Avail: NTIS HC A06/MF A01 CSCL 06/20

This directory catalogues the organizations currently engaged in neurobehavioral bioassay utilization or development and provides information concerning specific measurements performed, test systems employed and compounds tested for the U.S. Army Medical Bioengineering Research and Development Laboratory. Author (GRA)

**N81-33771#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 15, NO. 4, JULY - AUGUST 1981**
28 Sep. 1981 155 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 (JPRS-79085) Copyright. Avail: Issuing Activity

The physiological effects of various exobiological phenomena are discussed. Emphasis is placed on: hemodynamic response; lower body negative pressure; and orthostatic tolerance.

**N81-33772#** Joint Publications Research Service, Arlington, Va.
**LINEAR DISCRIMINANT FUNCTION USED TO ASSESS COSMONAUT REACTION TO LBNP**
A. D. Voskresenskiy, V. A. Degtyarev, V. G. Doroshev, N. I. Vikhrov, Zh. V. Barsukova, and N. A. Lapshina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 1-4 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 4-6

Avail: Issuing Activity

Efforts were made to formalize the procedure of summarizing data collected from the measurement of hemodynamic parameters during the lower back negative pressure (LBNP) test. It is shown that linear discriminant function can be used to rate reactions to LBNP. Major emphasis was placed on the acquisition of effective linear discriminant functions to assess the reactions to LBNP from the results of examining cosmonauts who have performed long term orbital flights. R.C.T.

**N81-33773#** Joint Publications Research Service, Arlington, Va.
**COMPARISON OF DIRECT AND INDIRECT METHODS OF MEASURING CARDIAC OUTPUT**
V. G. Doroshev, N. N. Popov, V. P. Katuntsev, N. A. Lapshina, O. B. Kulikov, G. K. Chizhov, V. A. Galichiy, K. S. Yurova, and R. I. Finogenova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 5-8 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 7-9

Avail: Issuing Activity

Cardiac output was measured in anesthesized dogs directly (by the method of Fick and by electromagnetic flowmetry) and indirectly (by the method of Bremser-Ranke and by rheography). The measurements were carried out before and after drug tests. The absolute values of cardiac output at rest differed depending on the method used. After the drug test, all the methods revealed distinct changes in cardiac output. A good correlation between flowmetric and rheographic methods was demonstrated. Results indicated that both methods can be used in rapidly changing hemodynamic situations. The method of Bremser-Ranke proved more suitable for the processes developing within 30-40 seconds. R.C.T.

**N81-33774#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF NEGATIVE PRESSURE AND OCCLUSION CUFFS ON INTRAVASCULAR PRESSURE IN LEGS OF HEALTHY MAN**
V. Ye. Katkov, V. V. Chestukhin, E. M. Nikolayenko, S. V. Gvozdev, and V. V. Rumyantsev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 9-13 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 9-12
Avail: Issuing Activity

The effect of local negative pressure on the leg (with a bladder sealed above the knee) and occlusion cuffs (located as close as possible to Poupart's ligament) on the leg intravascular pressure was investigated in recumbency. Eight healthy volunteers participated in two experimental runs. Each of the two exposures was used at two levels: local negative pressure at -50 and -100 mm Hg; and occlusion cuffs at +40 and +50 Hg with exposure time averaging 5-7 min. Catheters were inserted into the femoral artery and vein, and arteries and veins of the back of the foot. The arterial pressure remained unchanged during both exposure (local negative pressure and occlusion cuffs). Upon exposure to local negative pressure the venous pressure in the back of the foot (with respect to the atmospheric pressure) did not change and in the femoral vein decreased. Upon exposure to occlusion cuffs the venous pressure in the back of the foot increased noticeably and in the femoral vein decreased slightly. R.C.T.

**N81-33775#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF LOWER BODY NEGATIVE PRESSURE (CHIBIS GARMENT) AND LOCAL NEGATIVE PRESSURE ON CENTRAL CIRCULATION IN HEALTHY MAN**
V. Ye. Katkov, V. V. Chestukhin, E. M. Nikolayenko, S. V. Gvozdev, V. V. Rumyantsev, and Ye. V. Kolpakov *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) p 14-21 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug.

1981 p 13-18
Avail: Issuing Activity

Catheters were chronically implanted into pulmonary and radial arteries of 8 healthy volunteers to examine the effect of lower body negative pressure (LBNP in the Chibis suit) and local negative pressure on the leg on central circulation, oxidative metabolism and acid base equilibrium in the blood. In 1 hour head down tests (at -20 deg) the effect of two regimens of LBNP (at -30 and -60 mm Hg) was studied, each exposure averaging 15-20 min. Both LBNP and local negative pressure induced changes in central circulation that were similar qualitatively and dissimilar quantitatively. Author

**N81-33776#** Joint Publications Research Service, Arlington, Va.
**USE OF NUTRIENTS TO CORRECT THE ADRENOCORTICAL SYSTEM**
S. Kalandarov, V. P. Bychkov, I. D. Frenkel, and T. P. Petukhova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 22-26 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 19-22

Avail: Issuing Activity

Two 60 day studies in which 10 healthy volunteers participated were carried out. In both studies stress situations were simulated by a chamber rise to an altitude of 8000 m, anticipation of exposure to acceleration, and psychological tests. The changes found were dependent on both the type of the stressor applied and duration of the exposure. Results indicate that nutrient supplements did not influence the adrenocortical function of the adrenals. R.C.T.

**N81-33777#** Joint Publications Research Service, Arlington, Va.
**ECHOVENTRICULOMETRY USED TO STUDY SPINAL FLUID CIRCULATION DURING REDISTRIBUTION OF FLUIDS IN A CRANIAL DIRECTION**
V. I. Sokolov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug 1981 (JPRS-79085) 28 Sep. 1981 p 27-29 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 22-23

Avail: Issuing Activity

The possibility of evaluating intracranial spinal fluid pressure by means of echoventriculometry is discussed. Major consideration is given to the capability of the technique to evaluate the functional and adaptive mechanisms involved in maintaining cerebral hemodynamics and dynamics of spinal fluid. Significant results are reported. R.C.T.

**N81-33778#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF ONE DAY IMMERSION ON CARDIORESPIRATORY PARAMETERS OF MAN DURING EXERCISE**
S. M. Belyayev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 30-33 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 24-26

Avail: Issuing Activity

The effect of 1 day water immersion (dry immersion) on cardiorespiratory parameters of test subjects performing submaximal exercises was studied. Individual changes involving increases in heart rate and cardiac load index, and decreases in oxygen pulse and systolic volume were observed. These changes suggest a decline of adaptive ability of the human body to muscular loads after 1 day water immersion. R.C.T.

**N81-33779#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF HYPOKINESIA IN HEAD DOWN POSITION ON MAN'S EQUILIBRIUM FUNCTION**
A. R. Kotovskaya, L. N. Gavrilova, and R. R. Galle *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 34-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 26-29

Avail: Issuing Activity

Six test subjects participating in a 182 day head down study at -4 deg were examined stabilographically before and during the test. During the first 30 days the subjects showed impaired equilibrium which later was relatively stabilized, continuation of the bed rest study did not impair drastically stability of upright standing. It was shown that the contribution of optic sensors into the recovery of the equilibrium function increased during the second half of the bed rest study. Provocative tests suggest that bed rest related impairment of equilibrium occurs due to vestibular changes and deconditioning. R.C.T.

**N81-33780#** Joint Publications Research Service, Arlington, Va.
**PROGNOSTIC VALUE OF BLOOD CHOLESTEROL LEVEL IN HEALTHY SUBJECTS**
V. V. Vlasov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 39-43 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 30-33

Avail: Issuing Activity

An hypothesis was developed which states that normal values (reference values for healthy individuals) can be statistically formed by screening a random group of people or even as a characteristic of a certain heterogeneous random clinical group (reference group). The records of in hospital examination of 355 pilots and navigators between the ages of 34-36 and 33-41 years were studied. Blood cholesterol level was selected as the analyzed parameter. Results indicate that blood cholesterol concentration in healthy flight personnel 35 years of age differs from the recommended reference range and constitutes 5.78 + or - 0.73 mM/1. Other significant results are reported. R.C.T.

**N81-33781#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF EXERCISE ON REACTIONS TO BREATHING A GAS MIXTURE WITH 5% CARBON DIOXIDE AND 14% OXYGEN**
N. P. Krasnikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 44-47 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 33-35

Avail: Issuing Activity

The effect of a hypoxic hypercapnic gas mixture (5% CO2 + 14% O2) on the exercising man was studied. At a low work load inhalation of this gas mixture inhibited gas exchange, and after 10 month training stimulated it. Increase in physical endurance was followed by increase in human resistance to O2 deficiency and CO2 excess in the breathing mixture. Author

**N81-33782#** Joint Publications Research Service, Arlington, Va.
**SENSITIVITY TO ANTIBIOTICS OF LACTOBACILLI FROM DIGESTIVE TRACT OF SOYUZ-13 AND SALYUT-4 CREW MEMBERS**
A. A. Lentsner, M. E. Tyur, Kh. P. Lentsner, M. E. Mikelsaar, V. M. Shilov, N. N. Lizko, and G. D. Syrykh *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 83-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 36-39

Avail: Issuing Activity

Sensitivity to 10 antibiotics of 411 lactobacillar strains isolated from the saliva and feces of crewmembers who made 8, 30 and 63 day flights was determined. Antibiotic sensitivity remained unchanged even in the 63 day flight. The antibiotics tested produced different effects on the lactoflora that varied from gentle polymyxin and gentamycin, less gentle neomycin and monomycin, to hazardous pencillin and erythromycin, then rifampicin and levomycetin, and, finally, tetracyclin and oleandomycin. Author

**N81-33783#** Joint Publications Research Service, Arlington, Va.
**STUDY OF DIGESTIVE TRACT MICROFLORA OF SOYUZ-13 AND SALYUT-4 CREWS**
A. A. Lentsner, Kh. P. Lentsner, M. E. Mikelsaar, V. M. Shilov, N. N. Lizko, G. D. Syrykh, and V. I. Legenkov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. -

Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 48-52 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 39-43

Avail: Issuing Activity

The species composition and biology of lactoflora of the saliva and feces of crewmembers from 8, 30 and 63 day flights was investigated. Altogether 593 strains of lactobacilli were examined. The space flights did not cause significant changes in physiology, biochemistry, antagonistic properties or lysozyme activity of lactobacilli. They did not change drastically or unify the species composition of the digestive lactoflora. However, transfer of lactobacilli from one crewmember to another cannot be excluded, its probability increasing with flight time. Author

**N81-33784#** Joint Publications Research Service, Arlington, Va.

### EFFECTIVENESS OF DECOMPOSITION OF PLANT WASTE BY MICROORGANISMS UNDER AEROBIC CONDITIONS

I. L. Chernovich, L. M. Sidorova, and N. A. Maltseva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 53-59 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 44-45

Avail: Issuing Activity

Degradation of plant wastes by means of microbial coenosis under aerobic conditions was studied. Efficiency of the process increased with increase in time and temperature. Microbial degradation of vegetable wastes was more complete than that of wheat wastes. Author

**N81-33785#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF SEX HORMONES ON SOME PARAMETERS OF CARBOHYDRATE METABOLISM IN THE LUNGS OF HYPOXIC RATS

N. N. Pribylova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 60-62 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 45-48

Avail: Issuing Activity

Experiments were carried out to reveal changes in the content of glucose, glycogen, pyruvate and lactate and in the activity of hexokinase and lactate dehydrogenase in the lungs of white rats exposed to 7 and 35 day hypoxia (rise to 9000 m for 6 hours daily) and treated with progesterone and testosterone. Treatment with the steroid hormones during chronic hypoxia increased the pulmonary content of glucose, glycogen, pyruvate, and decreased hexokinase activity and lactate accumulation. Author

**N81-33786#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF CHRONIC GAMMA IRRADIATION ON PROTEIN COMPOSITION AND CHOLESTEROL CONTENT OF CANINE BLOOD

A. A. Akhunov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS) 28 Sep. 1981 p 63-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 48-50

Avail: Issuing Activity

In a chronic experiment dogs were exposed to radiation in doses of 190, 380, and 560 rad for 3 years. As compared to the unradiated controls they showed a slower recovery of the albumin and cholesterol content in the blood. The cholesterol content varied, depending on the dose of chonic irradiation, whereas the protein content did not show such a correlation Author

**N81-33787#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF STATIONARY MAGNETIC FIELD ON THE THYROID

V. M. Katola, A. D. Chertov, V. I. Kirichenko, A. B. Priogov, and V. I. Molchanov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 68-70 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 50-52

Avail: Issuing Activity

Rats were exposed to a constant magnetic field of 26268 A/m. Depending on the exposure time, the thyroid gland showed changes in the follicular epithelium height, content of ribonucleoproteins and PAS-positive substance, activity of adenylate cyclase, whereas blood serum exhibited changes in the concentration of thyroid hormones and no changes in the content of thyrotropic hormone. Author

**N81-33788#** Joint Publications Research Service, Arlington, Va.

### MECHANISM OF ADRENOSYMPATHETIC SYSTEM REACTION TO SINGLE EXPOSURE TO VARIABLE MAGNETIC FIELD

S. A. Sakharova, A. I. Ryzhov, and N. A. Udintsov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 71-73 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 52-56

Avail: Issuing Activity

In view of the complex nature and functional correlation between the adrenosympathetic system (ASS) and central nervous system, glucocorticoid function of the adrenals and catecholamine (CA) reserves, the role of these relationships in formation of the response of the ASS to a variable magnetic field (VMF) was investigated. Phenobarbital was used to exclude the central nervous system. Rausedyl was used to mobilize reserve catecholamines; dexasone induced compensatory atrophy of the adrenal cortex; after splanchnotomy, visible vessels and the lipid capsule were swabbed with formalin. The reaction of the ASS to VMF was absent in experiments where phenobarbital and rausedyl were administered and splachnotomy performed, whereas with administration of dexasone only a mediator part was not involved in the reaction. Experiments with rausedyl demonstrated that the CA reserve levels in organs play an important role in formation and degree of ASS reaction to the stressor, whereas the hemodynamic and morphological changes in cellular elements of organs induced by the field were related to mobilization of reserve CA. M.G

**N81-33789#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF ATTENUATED GEOMAGNETIC FIELD ON E. COLI RESISTANCE TO ULTRAVIOLET RAYS

O. A. Alferov and T. V. Kuznetsova *In its* USSR Rept. Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 74-79 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v 15, no 4, Jul. - Aug. 1981 p 57-58

Avail: Issuing Activity

The effect of an attenuated geomagnetic field on E. coli tolerance to ultraviolet irradiation was studied. The geomagnetic field was shielded to provide 40- and 160-fold attenuation. It was demonstrated experimentally that the 160-fold attenuated field increased E. coli tolerance, whereas the 40-fold attenuated field decreased it. The geomagnetic effect depended on the exposure time, reaching maximum after five passages of E. coli. An additional magnetic field smulating the geomagnetic field generated in a shielded chamber reversed the effect of an attenuated geomagnetic field. M.G.

**N81-33790#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF FLIGHT ABOARD COSMOS-936 BIOSATELLITE ON CONTRACTILE PROPERTIES OF RAT MUSCLE FIBERS

V. S. Oganov, S. A. Skuratova, and M. A. Shirvinskaya *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 80-82 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 58-61

Contractile properties of glycerinated fibers of skeletal muscles of rats flown for 18.5 days on Cosmos-936 were investigated. In slow antigravitational muscles (soleus m. and triceps brachii m.), decrease in the amplitude of isometric tension and performance as well as acceleration of the contraction development were observed. A high specificity of reactions of

skeletal muscles to the experimental conditions is indicated, depending on their functional specialization. It is suggested that changes in contractile properties of myofibrillar proteins may contribute to the adaptive rearrangement of functional properties of antigravitational muscles under the influence of space flight.
M.G.

**N81-33791#** Joint Publications Research Service, Arlington, Va.

### ARTIFICIAL GRAVITY AS A MEANS OF PREVENTING ATROPHIC SKELETAL CHANGES

G. P. Stupakov *In its* USSR Rept: Space Biol. and Aerospace Med, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 88-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 62-63

Avail: Issuing Activity

The efficacy of artificial gravity, created by an onboard centrifuge in the Cosmos-936 biosatellite, as a means of preventing development of osteoporosis in weightlessness was tested. The results indicated that exposure of rats to artificial gravity of 1 g can prevent development of osteoporosis. M.G.

**N81-33792#** Joint Publications Research Service, Arlington, Va.

### STATES OF CATECHOLAMINES AND ENZYMES OF SYNTHESIS THEREOF IN THE ADRENAL MEDULLA OF RATS AFTER FLIGHT ABOARD COSMOS-936 BIOSATELLITE

R. Kvetnyanski, T. Torda, R. A. Tigranyan, Yu. Chulman, and A. M. Genin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 91-93 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 64-65

Avail: Issuing Activity

In the adrenals of weightless and centrifuged rats flown for 18.5 days onboard the biosatellite Cosmos-936, indicators of the activity of the adrenomedullary system, i.e., the content of catecholamines and activity of the enzymes involved in their synthesis (tyrosine hydroxylase and dopamine-beta-hydroxylase) were measured. It was found that none of the indicators changed postflight. These findings show that a prolonged exposure of rats to weightlessness does not act as a strong stressor for the adrenomedullary system.
M.G.

**N81-33793#** Joint Publications Research Service, Arlington, Va.

### FLOUR BEETLE REPRODUCTION AND MUTABILITY IN WEIGHTLESSNESS (EXPERIMENTS ABOARD SALYUT-6 ORBITAL STATION)

G. P. Parfenov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 94-100 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 66-70

Avail: Issuing Activity

The effects of weightlessness on reproduction and mutability in beetles were investigated. Experiments with the flour beetle Tribolium castaneus showed that in weightlessness these insects completed their cycle of development--from fertilization to the emergence of mature imago of the next generation--in the normal way. Survival of specimens, densities of cultures, duration of development, and frequency of morphoses in flight and control studies were similar. Exposure to weightlessness did not increase the number of genetic changes.
M.G.

**N81-33794#** Joint Publications Research Service, Arlington, Va.

### COMPUTER USE FOR AUTOMATIC MEASUREMENT OF SOME PHYSIOLOGICAL PARAMETERS

V. A. Degtyarev, N. M. Zhurba, Yu. A. Kukushkin, V. G. Doroshev, and N. A. Lapshina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 101-106 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 70-73

Avail: Issuing Activity

The possibility of automatic processing of some hemodynamic parameters included in the set of medical monitoring methods for manned orbital station crews was investigated. The physiological parameters of sphygmograms of the carotid, radial, and femoral arteries; kinetocardiograms; tachoscillograms; and electrocardiograms were recorded synchronously with an onboard Polynome-2M apparatus. These curves were then interpreted automatically and the hemodynamic parameters were calculated with a computer. The algorithms are described in some detail. M.G.

**N81-33795#** Joint Publications Research Service, Arlington, Va.

### METHOD FOR EVALUATING RESPIRATORY SYSTEM REACTION TO INCREASING HYPERCAPNIA

L. A. Ivanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 107-111 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, July. - Aug. 1981 p 74-76

Avail: Issuing Activity

The methodology and results of an experiment to test the effect of progressive hypercapnia on pulmonary ventilation are described. According to this method, the subject breathes from a spirograph, from which the CO2 absorber is removed. A carbograph is connected in parallel with the spirograph in order to record CO2 concentration concurrently with pulmonary ventilation. One finds the points in the system of coordinates characterizing the correlation between partial CO2 tension in alveolar air and minute volume by plotting the former on the x-axis and the corresponding later on the y-axis. By drawing a line through these points, one obtains a curve of minute volume as a function of PACO2, which reflects the reaction of the respiratory center to CO2. The intersection of this line on the x-axis corresponds to the point that characterizes PACO2 level, at which ventilation equals zero (sensitivity of the respiratory center to CO2).
M.G.

**N81-33796#** Joint Publications Research Service, Arlington, Va.

### LOG-LINEAR REGRESSION METHOD USED TO ASSESS QUALITY OF AIR SAMPLES IN FLUOROPLASTIC CONTAINERS

V. Ye. Ryzhkova, Ye. N. Kulkov, and K. N. Mikos *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 112-115 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 76-78

Avail: Issuing Activity

The possibility of using fluoroplastic containers for storage of air samples containing traces of organic matter was investigated. Gas chromatographic analysis of samples from containers was performed immediately after they were filled with a mixture, after 4, 6, 8, and 24 hours on the first day, then once a day for 10 days. The results show that there was virtually no change in concentrations of saturated hydrocarbons (methane, ethane) during storage. There was exponential change in levels of oxygen-containing organic substances (methanol, ethanol, acetone, and ethyl acetate). The change as particularly intensive in the first 6 hours. Regression analysis was performed to demonstrate dependence of concentration on storage time. A log-linear regression model was constructed using the least squares method.
M.G.

**N81-33797#** Joint Publications Research Service, Arlington, Va.

### AGE-RELATED CHANGES IN BODY AND VISCERAL WEIGHT OF WISTAR RATS

G. I. Plakhuta-Plakutina, Ye. I. Alekseyev, G. N. Durnova, Ye. I. Ilina-Kakuyeva, A. S. Kaplanskiy, A. S. Pankova, Ye. A. Savina, V. N. Shvets, and V. I. Yakovleva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 116-120 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 79-81

Avail: Issuing Activity

The patterns of growth of the body, absolute and relative weight of internal organs, endocrine glands, different muscles, and linear parameters of the skeleton of the Wistar rat were investigated. The results indicate that rats grow the most intensively up to the 80th to 90th day of postnatal ontogenesis. Starting in the third month of life there is some stabilization of the relative weight of internal organs. It is recommended to use animals from the age of 3 months in experiments conducted to investigate the effects of various extreme factors on the adult organism. Additional recommendations are given. M.G.

**N81-33798#** Joint Publications Research Service, Arlington, Va.
**METHOD OF TESTING WHITE RAT ELEVATOR RESPONSE**
G. S. Ayzikov, A. S. Markin, A. V. Mokrousova, and I. Yu. Sarkisov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 121-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 82-84

Avail: Issuing Activity
A device to study the latency period of the elevator reaction (LPER) of white rats is described in detail. The device was developed in accordance with a program of inflight experiments aboard Cosmos-936 and Cosmos-1129 to analyze the state of vestibulomotor reactions of animals. M.G.

**N81-33799#** Joint Publications Research Service, Arlington, Va.
**SUBCUTANEOUSY IMPLANTED CONNECTOR TO RECORD ARTERIAL PRESSURE AND MAKE ELECTRICAL CONTACT**
Yu. Ya. Gaich, V. S. Baranov, V. V. Suchkov, and O. S. Medvedev *In its* USSR Rept. Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 125-217 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 84-85

Avail: Issuing Activity
The design of a catheter, with a nipple connector on the end, which is completely implanted under the skin is described. The connector could, with minor alteration of design, be used to provide temporary electrical contact. M.G.

**N81-33800#** Joint Publications Research Service, Arlington, Va.
**METHOD FOR ATTACHING CEREBRAL THERMOCOUPLE WIRES TO THE DOG'S SKULL**
O. Ya. Ozerova *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 128-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 85-86
Avail: Issuing Activity
A method for attaching brain thermocouple wires to the dog's skull, which would make it possible to retain natural heat insulation of the brain, is discussed. The hardware and surgical procedures are described in detail. M.G.

**N81-33801#** Joint Publications Research Service, Arlington, Va.
**METHOD FOR EVALUATING RESPIRATORY SYSTEM REACTION TO INCREASING HYPERCAPNIA**
L. A. Ivanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 107-111 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, July. - Aug. 1981 p 74-76
Avail: Issuing Activity
The methodology and results of an experiment to test the effect of progressive hypercapnia on pulmonary ventilation are described. According to this method, the subject breathes from a spirograph, from which the CO2 absorber is removed. A carbograph is connected in parallel with the spirograph in order to record CO2 concentration concurrently with pulmonary ventilation. One finds the points in the system of coordinates characterizing the correlation between partial CO2 tension in alveolar air and minute volume by plotting the former on the x-axis and the corresponding later on the y-axis. By drawing a line through these points, one obtains a curve of minute volume as a function of PACO2, which reflects the reaction of the respiratory center to CO2. The intersection of this line on the x-axis corresponds to the point that characterizes PACO2 level, at which ventilation equals zero (sensitivity of the respiratory center to CO2). M.G.

**N81-33802#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF HYPOXIA ON AFFINITY OF HEMOGLOBIN FOR OXYGEN IN ANIMALS**
V. V. Gladilov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 134-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 88-89
Avail: Issuing Activity
The effect of hypoxia on the oxygen-binding property of hemoglobin was examined with a particular concern for the role of 2,3-diphosphoglycerinic acid as the oxygen-affinity regulator. Since the level of this phosphate in the blood of animals of different species and age is not the same, cats, rabbits, and hamsters of differing ages were used. M.G.

**N81-33803#** Joint Publications Research Service, Arlington, Va.
**CHANGES IN RABBIT IMMUNOREACTIVITY AS RELATED TO DURATION OF HYPOKINESIA**
V. V. Tyavokin, V. N. Sizov, G. V. Magnitskaiya, and Ye. A. Oleynikova *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 137-139 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 90-91

Avail: Issuing Activity
The effects of hypokinesia differing in duration and readaptation period on the body's nonspecific defense factors were examined. The tests to dertermine the intensity of spontaneous immunity included: bactericidal, lysozyme, beta-lysine, blood serum complement activity and neutrophil phagocytic reaction, which consisted of phagocytotic activity, intensity and completion of phagocytosis. M.G.

**N81-33804*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**NON-INVASIVE METHOD AND APPARATUS FOR MEASURING PRESSURE WITHIN A PLIABLE VESSEL**
Masashi Shimizu 19 Feb. 1981 14 p
(NASA-Case-ARC-11264-1; US-Patent-Appl-SN-235866) Avail: NTIS HC A02/MF A01 CSCL 06B
A non-invasive method and apparatus for measuring pressure within a pliable vessel such as a blood vessel are described. The blood vessel is clamped by means of a clamping structure having a first portion housing a pressure sensor, and a second portion extending over the remote side of the blood vessel for pressing the blood vessel into engagement with the pressure sensing device. The pressure sensing device includes a flat deflectable diaphragm portion arranged to engage the blood vessel. In one embodiment, the clamp structure includes first and second semicylindrical members held together by retaining rings. In a second embodiment the clamp structure is of one piece construction having a solid semicylindrical portion and a hollow semicylindrical portion with a longitudinal slot in the hollow semicylindrical portion through which to slip the blood vessel. In a third embodiment, an elastic strap is employed for clamping the blood vessel against the pressure sensing device. NASA

**N81-33806#** Cornell Univ., Ithaca, N.Y.
**PRIMARY EVENTS IN VISION Final Technical Report**
Aaron Lewis 27 Sep. 1980 16 p
(Contract N00019-79-C-0621)
(AD-A095369) Avail: NTIS HC A02/MF A01 CSCL 06/16
This report focuses on the fundamental mechanisms by which light energy is converted into a neural response in visual photoreceptor cells. Research in this area has approached the stage that permits the piecing together the molecular mechanisms between absorption of light and the generation of a neural response. Consideration is given to the primary molecule of visual photoreception--rhodopsin. The molecule is composed of a form of vitamin A which is called retinal, and this form of vitamin A is connected through a Shift base-nitrogen linkage to a membrane glycoprotein matrix called opsin. The combination of retinal and opsin is called rhodopsin. The question of light absorption by rhodospin is discussed. It has been generally accepted that

retinal interaction indeed undergoes structural alteration between rhodopsin and bathorhodopsin. A new aspect represented by the above mechanism is a movement of the proton in the protein. Measurements indicated that, as a result of the absorption of light, one of the first molecular events is the motion of a proton, and this is probably the first ion movement that is initiated by the rhodopsin molecule. Other experiments are showing that there are several other chemical species activated by the absorption of light in the rhodopsin molecules. GRA

**N81-33806#** Naval Medical Research Inst., Bethesda, Md.
**HUMAN ENGINEERING EVALUATION OF THE HYPERBARIC RESEARCH FACILITY** Final Report
J. I. Brady and M. D. Curley Jul. 1981 69 p refs
(AD-A103681; NMRI-81-47) Avail: NTIS HC A04/MF A01
CSCL 14/2

The human engineering evaluation and human factors deficiencies were studied. Recommendations for alterations or additions were made which are grouped under the headings of: work place or watch station, environment, personnel, and emergency systems. The majority of recommendations dealt with control panel layouts, functional grouping, gauge placement, and chamber habitability. At the present time, the most serious problem identified is the excessive noise levels in the control area of the chambers. Octave band analysis reveals that: (1) the primary noise sources are the life support loops and the building air conditioning system, and (2) because of the frequency distribution of the noise, ear protectors are not a viable solution since the peak noise levels fall in the same frequency range as the peak levels in male speech. Light levels throughout the complex generally fall within acceptable limits. The necessity for increased manpower is recommended. The HRF's emergency system displays high attention getting value through both auditory and visual alarms, and good readability. E.A.K.

**N81-33807#** California Univ., San Diego.
**MEASURING SLEEP BY WRIST ACTIGRAPH** Annual Report, 1 Apr. 1980 - 31 Mar. 1981
Daniel F. Kripke, John B. Webster, Daniel J. Mullaney, Sam Messin, and William Mason Mar. 1981 34 p refs
(Contract DAMD17-78-C-8040)
(AD-A103196; AR-3) Avail: NTIS HC A03/MF A01 CSCL 06/16

A method of monitoring personnel sleep and activity in field conditions needed to promote medical planning for modern combat was investigated. A wearable digital activity system was programmed, tested, and evaluated. A computer process for recognizing sleep from this system was defined. The systems allow collection of data from freely ambulatory subjects who can be scored automatically for sleep/wake with accuracy comparable to EEG scoring. The microprocessor based digital activity monitor is built to specifications, and external activity and illumination transducers are added. Since the errors that occur include both misscoring sleep as wake and vice versa, they tend to cancel. It is concluded that design criteria for a miniaturized wrist mounted activity monitor are suitable for field or combat use. E.A.K.

**N81-33808#** School of Aerospace Medicine, Brooks AFB, Tex.
**A FAST WALSH TRANSFORM ELECTROCARDIOGRAM DATA COMPRESSION ALGORITHM SUITABLE FOR MICROPROCESSOR IMPLEMENTATION** Final Report, Jun. - Aug. 1980
Walter S. Kuklinski and Al M. Zied Jun. 1981 27 p refs
(AF Proj. 7755)
(AD-A104115; SAM-TR-81-13) Avail: NTIS HC A03/MF A01 CSCL 06/5

The feasibility of using a sequency-ordered Fast Walsh transform algorithm in a transformation-type ECG data compression scheme was demonstrated. The relationship of the mean square error between the original and reconstructed ECG signals as a function of the number of Walsh coefficients retained and the number of bits used to represent each coefficient was determined. A finite impulse response digital low-pass filter was tested as a means of improving the diagnostic characteristics of the reconstructed ECG waveforms. Suggestions for further work in this area are included. Author (GRA)

**N81-33809#** Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
**AEROSOL FACTORS AFFECTING RESPIRATORY DEPOSITION**
P. E. Morrow 1981 13 p refs Presented at the Conf. on Deposition and Clearance of Aerosols in the Human Respiratory Tract, Bad Gleichenberg, Austria, 22 May 1981
(Contract DE-AC02-76EV-03490)
(DE81-024425; UR-3490-2026; CONF-810584-1) Avail: NTIS HC A02/MF A01

Aerosol deposition in the human respiratory system results from the interaction of the physical properties of the aerosol particles, the constantly changing dynamic character of the respired air, and the special architecture of the conducting airways and pulmonary parenchyma. These aspects fall into two categories: those derived from the aerosol and those associated with the human respiratory system, per se. Particle size is the most significant and in this respect, specifically, the hygroscopicity of particles and the heterodispersity of aerosols. Hygroscopicity is discussed in the context of the inconsistent data on respiratory humidification and temperature and their impact on hygroscopic growth models and particulate deposition estimations. Heterodispersity of aerosols considers the application of several models of respiratory functional anatomy and of aerosol deposition. The mass deposition estimates based on monodisperse particles and these models were found to be satisfactory for heterodisperse aerosols. DOE

**N81-33810#** ELMED G.m.b.H., Augsburg (West Germany).
**ECG-CONVERTER** Final Report
Wolfgang Mueller Bonn Bundesministerium fuer Forschung und Technologie Nov. 1980 23 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-111; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4,80

A conversion unit was designed which makes it possible to display a person's heart signal on the screen of a normal television (TV) receiver. The ECG signals, picked up from the patient, are amplified and then digitalized and stored in a high speed random access memory (RAM). This RAM is cyclically read out so that for each line of the TV picture, the total content is checked once. The complete content is fed to a comparator where it is compared with the line valence. In the case of equality, a dot is written at that place in the line. The analog signal is converted to a video signal which fits to any TV standard. After it is modulated with a carrier, this signal can be sent to any TV set and antenna plug. Author (ESA)

**N81-33811#** Akron Univ., Ohio.
**THE UNIVERSITY OF AKRON URBAN AIR POLLUTION AND HUMAN HEALTH STUDY**
Richard A. Mostardi, Daniel L. Ely, Nancy Woebkenberg, Mary Conlon, Marcia Jarrett, and Glenn Atwood Jun. 1981 165 p refs
(Grant EPA-R-804820)
(PB81-213282; EPA-600/1-81-050) Avail: NTIS HC A08/MF A01 CSCL 06T

The chronic effects of our pollution volunteers from East Cleveland, Ohio and counterparts from Elyria, Ohio was studied. The East Cleveland area was chosen for its proximity to heavy industrial air pollution, and Elyria, because it is an urban area with an excellent record for air quality. Air quality was monitored by two aerometric stations in each city. It is indicated that there are some significant differences in the young age groups for lung function tests and questionnaire responses in favor of Elyria residents. Differences in the older age groups, favor the Cleveland residents. It is suggested that there is some selective migration associated with the Cleveland study area and that there may be an air pollution effect on the younger volunteers. GRA

**N81-33812#** California Univ., Santa Barbara. Inst. of Environmental Stress.
**EFFECTS OF SULFURIC ACID MIST EXPOSURE ON PULMONARY FUNCTION** Final Report, 1 Apr. 1977 - 31 Aug. 1980
Steven M. Horvath, Lawrence J. Folinsbee, and John F. Bedi Jun. 1981 92 p refs
(Grant EPA-R-804853)

(PB81-208877: EPA-600/1-81-044) Avail: NTIS HC A05/MF A01 CSCL 06F

Effects of 2 hr exposure to sulfuric acid (H2SO4) on pulmonary functions in male nonsmokers were examined. Mass media diameter was 0.92 micrometer, a sequence of 20 min exercise and 20 min rest was repeated three times during each exposure. Pulmonary functions were measured preexposure and postexposure. No significant changes in pulmonary functions were observed for HESO4 exposure. An increased prevalence of symptoms, was observed for H2SO4 exposure, suggesting that H2SO4 may have caused some pulmonary irritation though not sufficient to induce functional changes. It is concluded that 2 hr exposure, with intermittent exercise, to H2SO4 in the one micrometer size range and in concentrations up to 1100 micrograms/cu m was relatively minor affects on the pulmonary system. GRA

**N81-33813#** Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

**PROCEDURES FOR EVALUATING NONPERTURBING TEMPERATURE PROBES IN MICROWAVE FIELDS** *Final Report*

Christian U. Hochuli May 1981 44 p refs Sponsored in part by World Health Organization

(PB81-205882: FDA/BRH-81/67: DHHS/PUB/FDA-81/8143) Avail: NTIS HC A03/MF A01 CSCL 06B

Test procedures performed on nonperturbing thermometer probes specifically intended for use in microwave fields are described. The procedures included tests for: accuracy of temperature measurement, temperature stability over time, and radiofrequency interference in the instrumentation. It is indicated that the newly designed probes are less perturbing in phantoms of simulated muscle tissue irradiated by microwave diathermy applicators and, therefore, are candidates for use in monitoring temperature during hyperthermia treatments. GRA

**N81-33814** British Library Lending Div., Boston Spa (England).

**LITERATURE SOURCES IN TOXICOLOGY: A SURVEY**

J. M. Hargreaves Jun. 1980 75 p refs

(BLL-BLRDR-5542: ISBN-0-905984-59-5: ISSN-0308-2385) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The survey is divided into the following sections: data bases, data banks, manual sources, institutions and research centers, and toxicology information programs of national and international organizations. Entries in each section are arranged alphabetically. Each entry includes information on coverage, file size, and indexing and searching characteristics. On some cases, selected references are provided to explain further the construction or use of the data files. T.M.

**N81-33815#** Canyon Research Group, Inc., Westlake Village, Calif.

**APPLICATIONS OF ADVANCED EXPERIMENTAL METHODS TO VISUAL TECHNOLOGY RESEARCH SIMULATOR STUDIES: SUPPLEMENTAL TECHNIQUES Final Report, 26 May 1978 - 31 Mar. 1980**

Charles W. Simon Orlando, Fla. Naval Training Equipment Center Jan. 1981 125 p refs

(Contracts N61339-78-C-0060, N61339-78-C-0096; NAVTRAEQUIPC Proj. 4781-6P5)

(AD-A095633: CWS-01-80; NAVTRAEQUIPC-78-C-0060-3) Avail: NTIS HC A06/MF A01 CSCL 05/9

This report is made up of a series of individual papers on techniques to enhance the behavioral research methods being used in the VTRS, or Visual Technology Research Simulator (formerly referred to as AWAVS, or Aviation Wide-Angle Visual System). These methods are applicable to many other topical areas in addition to flight simulation. The techniques discussed, which relate to problems of design, analysis and interpretation, are important addends to material discussed elsewhere by the author. The following techniques are discussed. What to do when the model for the experimental design inadequately represents the empirical data: Using Yates: algorithm with screening designs; Analyzing residuals; Identifying the experimental conditions in 2 (to the k minus p power) designs when given the defining generators; An economical design for screening interaction effects; Graphic method and internal comparison for multiple response data; The place for replication in economical multifactor research; The significance of tests of statistical significance; Determining the probability of accepting the null hypothesis when in fact it is false; Testing non-additivity in experimental data from a Latin square design; How to include factors with more than two levels in a screening design; Analyzing extra-period change-over designs; Analyzing serially-balanced sequence designs; and Design economy when experimental factors selectively affect bi-variate criteria. GRA

**N81-33816#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**EFFECT OF DIFFERENT RUNWAY SIZE ON PILOT PERFORMANCE DURING SIMULATED NIGHT LANDING APPROACHES**

Henry W. Mertens and Mark F. Lewis Feb. 1981 21 p refs

(AD-A102190; FAA-AM-81-5) Avail: NTIS HC A02/MF A01 CSCL 06/16

In Experiment 1, three pilots flew simulated approaches and landings in a fixed-base simulator with a computer-generated-image visual display. Practice approaches were flown with an 8,000-ft-long runway that was either 75, 150, or 300 ft wide; test approaches were to runways with widths of 75, 100, 150, 200, and 300 ft. In Experiment 2, 40 pilots controlled the slant of a moving model runway during simulated night visual approaches. Five different models simulated runways from 100 to 300 ft wide and 3,000 to 9,000 ft long. As predicted, training on a wide runway in Experiment 1 lowered approach angle in approaches to narrower runways; a narrow practice runway also raised approach angles to wider runways. The magnitude of these practice effects increased as distance from runway threshold decreased. There was also a general tendency for approach angles to decrease as runway width decreased. The latter effect was corroborated in Experiment 2; in addition, generated approach angles decreased with increasing runway length. Giving half the pilots information about runway size prior to each approach had no effect on responses. These findings add to the quantitative evidence of danger in night visual approaches due to visual illusions and large variability in the visual perception of approach angle. GRA

**N81-33817#** RAND Corp., Santa Monica, Calif.

**SELECTED RESEARCH PUBLICATIONS IN COGNITIVE SCIENCE BY RAND STAFF, 1979-1980**

Sarah Goldin, Barbara Hayes-Roth, Frederick Hayes-Roth, Philip Klahr, Dave McArthur, Kathleen Stasz, Perry Thorndyke, Clairice Veit, Don Waterman, Keith Wescourt et al Feb. 1981 30 p refs

(AD-A103311: RAND/P-5950/12) Avail: NTIS HC A03/MF A01 CSCL 05/1

The bibliography presented on the following pages is a compilation of recent publications by some of the Rand researchers in the Information Processing System research program. The bibliography is selective, comprising only those papers concerned with the broad range of topics in Cognitive Science. These topics include the modeling of complex human behaviors, the construction of intelligent computer systems, and the representation of knowledge in human and computer memories. The research draws upon the disciplines of cognitive psychology, educational psychology, computer science, artificial intelligence, and linguistics. GRA

**N81-33818#** Technology Service Corp., Santa Monica, Calif.

**ADVANCED COMPUTER IMAGE GENERATION TECHNIQUES EXPLOITING PERCEPTUAL CHARACTERISTICS** *Final Report*

Anthony J. Stenger, Timothy A. Zimmerlin, James P. Thomas, and Myron Braunstein Aug. 1981 330 p refs

(Contract F33615-78-C-0020; AF Proj. 6114)

(AD-A103365: AFHRL-TR-80-61) Avail: NTIS HC A15/MF A01 CSCL 09/2

The study objectives involve applying psychological knowledge of visual perception to improve real-time computer image generation (CIG) simulators. The primary objective is to suggest and identify CIG algorithms for visual simulation that improve the training effectiveness of CIG simulators. The secondary objective is to identify areas of basic research in visual perception that have a significant impact on improving CIG technology. The project proceeded in a sequence of three phases. The first phase entailed observing existing CIG simulators. During the second phase existing perceptual knowledge was studied in light of the capabilities and limitations of existing CIG simulators. In the third phase improved CIG algorithms were developed and relevant areas for further perceptual research were identified. Author (GRA)

**N81-33819#** Wisconsin Univ. - Madison. Graduate School of Business.
**ORGANIZATIONAL BEHAVIOR**
Larry L. Cummings and R. B. Dunham 3 Aug. 1981 91 p refs
(Contract N00014-79-C-0750; NR Proj. 170-892)
(AD-A103625; TR-1-1-8) Avail: NTIS HC A05/MF A01 CSCL 05/1

This paper reviews the literature on organizational behavior from 1977 through the first quarter of 1981 and attempts to be projective and prescriptive as well as descriptive of the work covered. Selected topics reviewed include new overviews and integrations of the field, task design, feedback, organizational structure, technology, and control, new conceptualizations and emerging topical trends. These topics were chosen to reflect both current and controversial issues to recent research. Additionally, this review attempts to bring the macro or organizational side of organizational behavior into focus and analysis and conclusions are drawn concerning theoretical and research needs. Finally, it projects the likely developments within organizational behavior. Author (GRA)

**N81-33820#** School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
**FIELD STUDY DETERMINATION OF VENTILATORY REQUIREMENTS OF MEN RAPIDLY EVACUATING A SPACE LAUNCH COMPLEX** Final Report, Jan. - Feb. 1980
Loren G. Myhre Nov. 1980 24 p
(AF Proj. 7930)
(AD-A095532; SAM-TR-80-43) Avail: NTIS HC A02/MF A01 CSCL 06/19

Physiological variables, including heart rate and minute ventilation, were monitored for 3 men and 1 women during field trails simulating the emergency evacuation of Space Launch Complexes (SLC) 4E and 4W at Vandenberg AFB in January 1980. It was concluded that a reasonably fit adult male rapidly evacuating the SLC works at a load approximating 65% of his aerobic capacity. Associated with this level of work is a ventilatory requirement of about 51 liters/min with corresponding peak inspiratory flow rates predicted to average about 180 liters/min. Under these conditions excessive rebreathing of expired air with the concomitant onset of hypoxia was clearly evident when wearing the Robertshaw Air Capsule is deemed to be unsuitable as a respiratory protection device during rapid evacuation of the SLG; its limited air supply (about 5 min) renders it a marginal device for a walking evacuation which requires about 4 min, 19 sec. The degree of protection from airborne contaminants provided by the Robertshaw Air Capsule under work stress conditions simulating both (a) rapid and (b) walking evacuation awaits laboratory testing. GRA

**N81-33821#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
**THE DEVELOPMENT AND AIRBORNE TESTING OF THE PALE SEAT** Final Report
Harald J. vonBeckh 20 Jun. 1981 102 p refs
(ZF61412001)
(AD-A103663; NADC-81200-60) Avail: NTIS HC A06/MF A01 CSCL 05/8

The development, centrifuge testing and airborne evaluation of the G-protective PALE (Pelvis and Legs Elevating) seat are described. This articulated seat achieves supination by elevating the pelvis and legs forward and upwards, while the head and shoulders barely move. Thus, out-of-the-cockpit vision and vision of displays are unchanged; labyrinthine symptoms are avoided, and head-up displays (HUD) can be easily used because the distance between windshield and eyes does not change. A historical review will list and describe all known seat configurations for prone and supine positioning that reached the stage of the airborne testing. The urgency to provide fighter aircraft with transverse positioned seats is emphasized. It is concluded that squadron of aircraft equipped with these seats will have an advantage in air combat situations. Author (GRA)

**N81-33822#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
**DEVELOPMENT OF IMPROVED SH-3 HELICOPTER SEAT CUSHIONS** Final Report
Dan Lorch 17 Jul. 1981 25 p refs
(AD-A103484; NADC-81186-60) Avail: NTIS HC A02/MF A01 CSCL 01/3

The proposed replacement seat cushions are made of closed cell foam and are painted with a flexible coating. Both the seat cushion and back cushion have ridges cut in the foam, and are covered with an open weave space fabric to improve air circulation. Test indicate that these cushions provide considerable improvement in comfort, reduction of maintenance and cost. Author (GRA)

**N81-33823#** Michigan Univ., Ann Arbor. Human Performance Center.
**THE DEVELOPMENT AND UTILIZATION OF INTEGRATED MULTIDIMENSIONAL DISPLAYS** Final Report, 1 Jun. 1976 - 30 Nov. 1980
Robert G. Pachella Feb. 1981 19 p refs
(Contract N00014-76-C-0648; NR Proj. 197-035)
(AD-A103170; HPC-67) Avail: NTIS HC A02/MF A01 CSCL 05/8

The purpose of this contract was to establish a program of research that would lead to basic facts about the nature of complex integrated multidimensional displays and their compatibilities with human perceptual abilities. Further, it was our goal to develop a comprehensive theory of multidimensional integrality as well as methodological techniques to investigate these questions. During the four and a half years of the contract's duration nine technical reports were issued and two more reports are in preparation. These detail the various empirical and theoretical pursuits of the principal investigator and his colleagues. A bibliography of these technical reports is appended. In addition to these written reports, contract work was reported orally at 16 scientific meetings and conferences. The research supported by the contract is presented under four major headings: (a) preliminary analyses of dimensional integrality, (b) necessary methodological developments for the study of integrality, (c) empirical findings and theoretical development, and (d) work in preparation. GRA

**N81-33824#** Anthropology Research Project, Yellow Springs, Ohio.
**AN ANTHROPOMETRIC DATA BASE FOR COMMERCIAL DESIGN APPLICATIONS, PHASE 1** Final Report, 1 Sep. 1980 - 28 Feb. 1981
John T. McConville, Kathleen M. Robinette, and Thomas Churchill 24 Feb. 1981 46 p refs
(Grant NSF DAR-80-09861)
(PB81-211070; NSF/BNS-81001) Avail: NTIS HC A03/MF A01 CSCL 05E

The feasibility of using for civilian designs the comprehensive body size data presently available to the armed forces was studied. The creation of an anthropometric data base for civilian uses from assembled data that were analyzed and applied to the design of military clothing, equipment, and workspaces is proposed. Statistical matching procedures and regression estimates were used to demonstrate that body sizes of U.S. males of working age, is characterized by information extrapolated from selected military samples. A large number of U.S. women is represented by military body size data, although military data were not available for women over 220 pounds. It is concluded that most commercial and industrial design needs for body size data can be met from the military data. GRA

**N81-33825#** Dynamic Science, Phoenix, Ariz.
**ANTHROPOMORPHIC DUMMY POSITIONING AND REPEATABILITY MEASUREMENTS** Final Report, Oct. 1980 - Jan. 1981
Jan. 1981 60 p
(Contract DT-NH22-80-C-0263)
(PB81-212367; Rept-3112-81-004; DOT-HS-805882) Avail: NTIS HC A04/MF A01 CSCL 13F

The purpose of the tests conducted was two fold: to determine if the proposed compliance procedure would provide repeatable results; and to see if the requirements can be met without violating the anchorage location requirements specified in FMVSS 210. Repeatability in the positioning of the upper torso of the dummy was poorer for the van and pick-up than for passenger cars. Position of the belt in the belt fit zone is not highly sensitive to variations in dummy position. For standard belt systems tested, modifications made to the seat belt assemblies would still meet the requirements of FMVSS 210. GRA

**N81-34136#** Southampton Univ. (England). Inst. of Sound and Vibration Research.

**BIODYNAMIC RESPONSE TO WHOLE-BODY VIBRATION**

M. J. Griffin *In* The Shock and Vibration Information Center (Defense) The Shock and Vibration Dig., Vol. 13, No. 8 Aug. 1981 p 3-12 refs

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375: $15.00/set CSCL 06/S

Experimental studies of biodynamic response to vibration and some attempts to model this response are reviewed. It is proposed that biodynamic models should be classified according to their general application. It is shown that the responses of the body to vibration are highly varied and that there is a need for increased availability of experimental biodynamic data. Author

N81-[illegible] [illegible] Univ. [illegible] Graduate School of Business.

ORGANIZATIONAL BEHAVIOR

Larry L. Cummings and [illegible] 5 Aug. 1981 [illegible] refs

(Contract N00014-79-C-0750; [illegible])

(AD-A[illegible]) [illegible] NTIS HC A02/MF A01 [illegible]

[illegible] Author (GRA)

N81-[illegible] School of Aerospace Medicine, Brooks AFB, Tex.

FIELD STUDY DETERMINATION OF VENTILATORY REQUIREMENTS OF MEN RAPIDLY EVACUATING A SPACE LAUNCH COMPLEX Final Report, Jan. - Feb. 1980

[illegible]

[illegible] GRA

N81-[illegible] Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

THE DEVELOPMENT AND [illegible] TESTING OF THE [illegible] SEAT Final Report

[illegible] 20 Jun. 1980 [illegible] refs

(AD-A1[illegible]) NADC-[illegible] Avail: NTIS HC A06/MF A01 [illegible]

[illegible] Author (GRA)

N81-[illegible] Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

DEVELOPMENT OF IMPROVED SH-3 HELICOPTER SEAT CUSHIONS Final Report

[illegible] 17 [illegible] 1981 25 p refs

(AD-A1[illegible]) NADC-[illegible] Avail: NTIS HC A02/MF A01 CSCL 01/3

[illegible] GRA

N81-[illegible] Anthropology Research Project, Yellow Springs, Ohio.

AN ANTHROPOMETRIC DATA BASE FOR COMMERCIAL DESIGN APPLICATIONS, PHASE 1 Final Report, 1 Sep. 1980 - 28 Feb. 1981

John T. McConville, Kenneth W. Robinette and Thomas Churchill 28 Feb. 1981 [illegible]

[illegible] GRA

N81-[illegible] Dynamic Science, Phoenix, Ariz.

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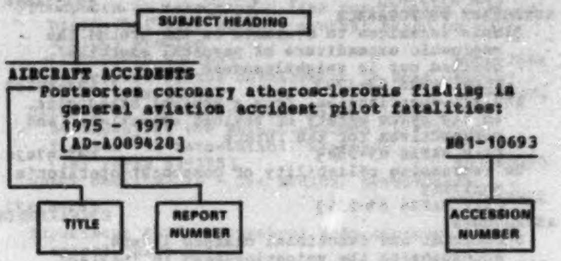
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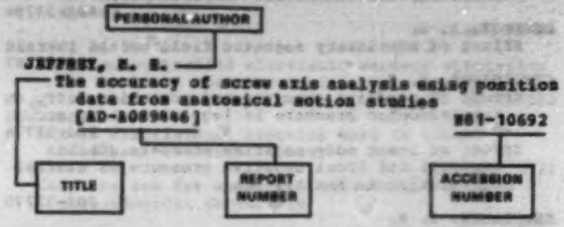
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# A CUMULATIVE INDEX
# TO
# A CONTINUING BIBLIOGRAPHY ON

# AEROSPACE MEDICINE AND BIOLOGY

**This Cumulative Index supersedes the indexes contained in supplements [SP-7011(216) through SP-7011(227)] published by NASA during 1981.**

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# INTRODUCTION

## WHAT THIS CUMULATIVE INDEX IS

This publication is a cumulative index to the abstracts contained in NASA SP-7011(216) through NASA SP-7011(227) of *Aerospace Medicine and Biology: A Continuing Bibliography*. NASA SP-7011, by means of supplements, serves as a current abstracting and announcement journal for references on bioscience and biotechnology. It has been compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA), and the National Aeronautics and Space Administration (NASA). Entries prepared by the two contributing organizations are identified as follows:

1. NASA entries by their *STAR* accession numbers (N81-10000 series)
2. AIAA entries by their *IAA* accession numbers (A81-10000 series)

## HOW THIS CUMULATIVE INDEX IS ORGANIZED

This Cumulative Index includes a subject index, a personal author index, and a corporate source index.

## HOW TO USE THE SUBJECT INDEX

Two types of cross references appear in the subject index:

1. Use (U) references indicate that the subject term is not "postable," i.e., not a valid term, and that the following term or terms are used instead. For example:

   DOSE
   U DOSAGE
   AIRLINERS
   U COMMERCIAL AIRCRAFT
   U PASSENGER AIRCRAFT

2. Narrower Term (NT) references refer the user to more specific headings in the same subject area, under which additional material on the subject may be found. For example:

   FATIGUE (BIOLOGY)
   NT AUDITORY FATIGUE
   NT FLIGHT FATIGUE
   NT MUSCULAR FATIGUE

In addition, a searcher may use the title or title and title extension in the index to narrow further his quest for particular items, this is because subject terms can readily include more than one class of document. For example:

BIOLOGICAL EFFECT
Vibratory force effect upon
biological systems, particularly
human organism.
Biological effect of cosmic and
solar radiations on human
body at high altitudes.

illustrates a case where two references on different topics are listed under the same subject term.

## HOW TO USE THE PERSONAL AUTHOR INDEX

All personal authors used in the abstract-section citations in the individual Supplements appear in the index. Differences in translation schemes may require multiple searching of the index for variants of an author's name. For example:

EMELIANOV, M. D.
and
YEMELYANOV, M. D.

## HOW TO USE THE CORPORATE SOURCE INDEX

The corporate source index entries are abridged versions of the corporate sources used in the abstract-section citations in the individual Supplements. The corporate source supplementary (organizational component) does not appear in the index. For example:

NEW MEXICO STATE UNIV., LAS CRUCES. DEPT. OF BIOLOGY. (Source citation entry)
NEW MEXICO STATE UNIV., LAS CRUCES. (Source index entry)

## IDENTIFICATION OF DESIRED SUPPLEMENT

The abstract and descriptive cataloging for any accession number selected from the indexes may be found in the appropriate Supplement. The page-number range of each Supplement appears on the inside front cover of this index. Once the range of page numbers containing the selected accession number is located in the second column, the desired Supplement number will be found in the first column. For example:

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## AVAILABILITY OF DOCUMENTS

Information concerning the availability of documents announced in *Aerospace Medicine and Biology* supplements is found in the Introduction to the most currently issued supplement.

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NEW MEXICO STATE UNIV., LAS CRUCES
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# SUBJECT INDEX

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1981 Cumulative Index

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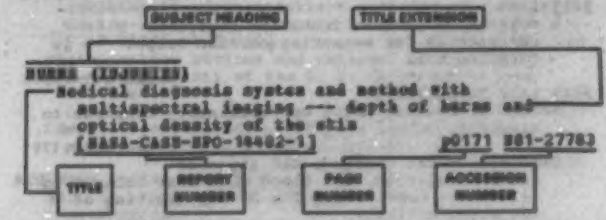
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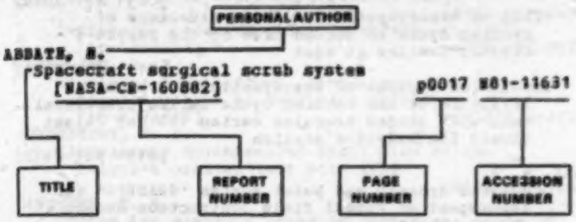

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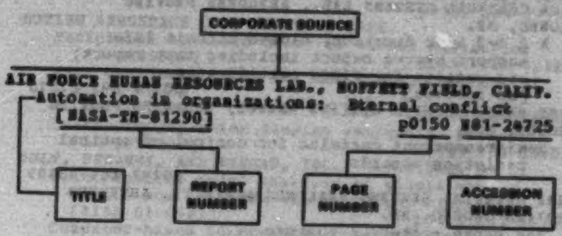
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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 229)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1982 in

- *Scientific and Technical Aerospace Reports (STAR)*
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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 109 reports, articles and other documents announced during January 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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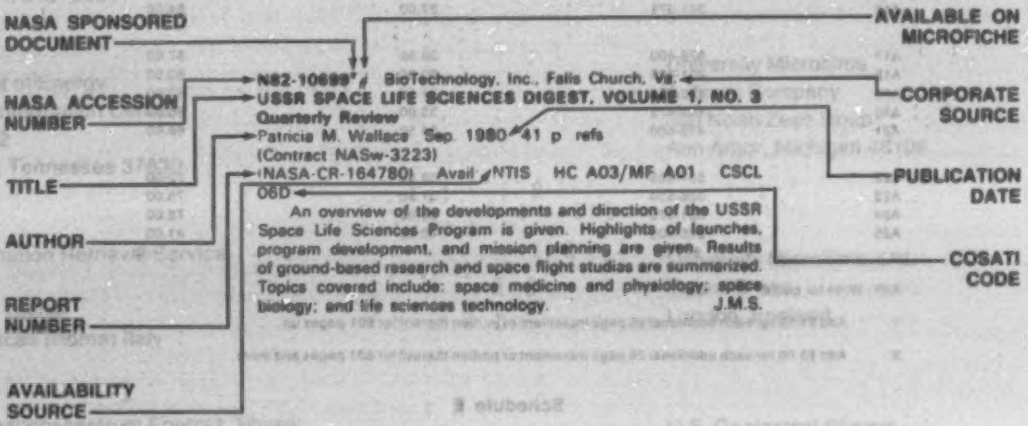
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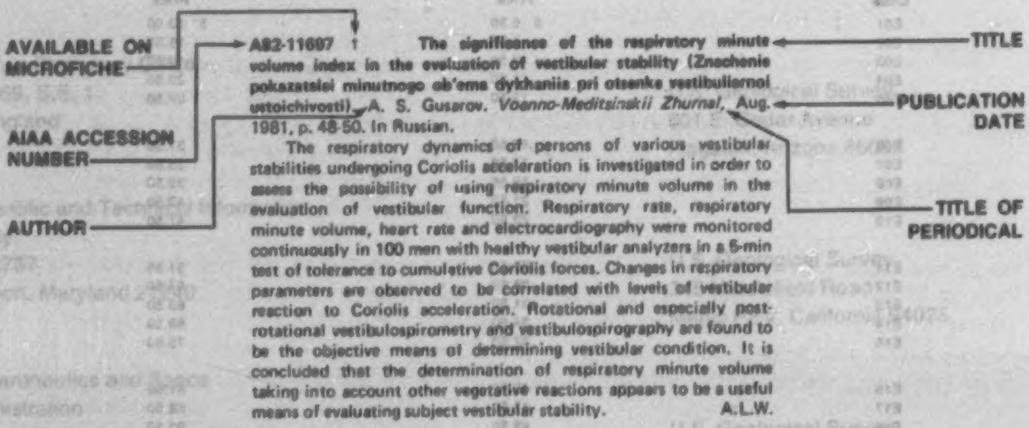
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A82-11607 # The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti). A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## A Continuing Bibliography (Suppl. 229)

FEBRUARY 1982

## IAA ENTRIES

**A82-10139 # A methodology for decision augmentation system design.** W. Zachary (Analytics, Inc., Willow Grove, PA) and J. Hopson (U.S. Naval Air Development Center, Warminster, PA). In: Computers in Aerospace Conference, 3rd, San Diego, CA, October 26-28, 1981, Collection of Technical Papers.
New York, American Institute of Aeronautics and Astronautics, 1981, p. 470-476. (AIAA 81-2201)

The domain of Decision Augmentation Systems (DAS) is composed of two general classes of systems, including decision automata and decision support systems. Problems in DAS design are examined, and the structure and organization of the DAS design framework are considered. The steps in designing a decision augmentation system are discussed, taking into account aspects of problem definition/decomposition, questions of problem aidability determination, automation level identification, decision function allocation, augmentation algorithmic technique selection, information sharing specification, and man/computer interface specification. Guidelines for DAS engineering are examined, giving attention to situation definition/decomposition guidelines, situation aidability determination guidelines, augmentation level identification guidelines, decision function allocation guidelines, technique selection guidelines, and information sharing specification guidelines. G.R.

**A82-10560 Are the 3,800-Myr-old Isua objects microfossils, limonite-stained fluid inclusions, or neither.** E. Roedder (U.S. Geological Survey, Reston, VA). *Nature,* vol. 293, Oct. 8, 1981, p. 459-462. 19 refs.

The nature of the yeast fossil-like ovoid and elliptical objects found in the 3800-million-year-old Isua supracrustal belt of southwest Greenland is discussed. Based on considerations of the deformation of the host material, the distribution of the clear and brown objects, the crystal nature of most of the clear objects, the nature of the actual fluid inclusions present, the distribution of the objects at the quartz grain boundaries and the solubility of the brown material in HCl, it is argued that the brown objects represent limonite-stained cavities from the otherwise complete dissolution by weathering of ferruginous dolomite grains. Additional evidence presented by Bridgwater et al. (1981) in support of the fluid inclusion nature of the brown and clear objects and by Pflug et al. (1978, 1979) in support of the fossil nature of the brown objects are interpreted as ambiguous. It is pointed out, however, that although the present objects can not be regarded as Precambrian fossils, it should be possible to find organic matter trapped within single crystals. A.L.W.

**A82-10630 Progress in computer analysis of the exercise electrocardiogram.** V. Bhargava, K. Watanabe, and V. F. Froelicher (California, University, San Diego, CA). *American Journal of Cardiology,* vol. 47, May 1981, p. 1143-1151. 34 refs. Grant No. NIH-HL-17682.

The development of digital computer techniques for the analysis of exercise electrocardiographic data is reviewed. Early computer studies concerned with the quantitative study of the Frank lead exercise electrocardiogram and the computerized measurement of the S-T index, S-T integral, S-T spatial magnitude and direction, S-T segment magnitude 60 ms after the end of the QRS complex, and the parameters of the Weiner et al. (1978) program are discussed, and commercial on-line exercise data processing systems and their applications in automated exercise electrocardiographic analysis, the development of a treadmill exercise score and the validation of S-T segment criteria for ischemia are examined. The theoretical aspects of the procedures used in digital processing are then considered, with attention given to analog to digital conversion, the mathematical constructs employed in processing, noise reduction, signal averaging, the data sampling window, spatial analysis based on S-T segment vectors and calibration based on with exercise radionuclide studies of myocardial perfusion and function. It is predicted that computerized exercise electrocardiography will become ubiquitous in the next decade due to revolutionary advances in microcomputers. A.L.W.

**A82-10631 Evaluation of abnormal exercise electrocardiogram in apparently healthy subjects - Labile repolarization /ST-T/ abnormalities as a cause of false positive responses.** P. L. McHenry, H. W. Richmond, B. L. Weisenberger, J. S. Rodway, G. F. Perry, and J. W. Jordan (Indiana University, Indianapolis, IN). *American Journal of Cardiology,* vol. 47, May 1981, p. 1152-1160. 16 refs. Research supported by the Herman C. Krannert Fund and American Heart Association; Grants No. NIH-HL-06308; No. NIH-HL-07182.

The significance of abnormal S-T segment responses in exercise electrocardiography of apparently healthy subjects is investigated based on a longitudinal study of 121 subjects. Men with a normal 12-lead electrocardiogram and normal heart size who were referred because of abnormal S-T segment responses to treadmill exercise testing were tested for labile ST-T wave abnormalities before and after hyperventilation, then underwent symptom-limited treadmill exercise testing in the fasting state during initial evaluation and in a follow-up period lasting up to 66 months. A tendency toward labile S-T or T wave abnormalities was noted in 61 of the subjects, of whom only one experienced a new coronary event, while of the remaining 60 subjects 34 exhibited significant coronary artery disease. A considerable variability in the appearance of labile ST-T wave changes and abnormal S-T segment responses to exercise is also observed. Statistical analysis of the records of 35 subjects without labile ST-T abnormalities has identified a set of criteria to distinguish true positive from false positive responses with a specificity of 82%, a sensitivity of 92% and a predictive value of 90%. A review of patient records also indicated that a serial conversion from a normal to an abnormal S-T segment response was not more predictive of coronary artery disease than an initially abnormal result. A.L.W.

**A82-10632 Variations in normal electrocardiographic response to treadmill testing.** V. F. Froelicher, R. Wolthuis, J. Fischer, and G. Uhl (USAF, School of Aerospace Medicine, Brooks AFB, TX; Medtronics, Inc.; California, University, San Diego, CA). *American Journal of Cardiology,* vol. 47, May 1981, p. 1161-1167. 25 refs.

Forty healthy young men at low risk for coronary artery disease underwent progressive maximal treadmill testing. Four bipolar electrocardiographic leads including CM5, CC5, inferior-superior Y, anterior-posterior Z, and a standard V5 were recorded and later computer-processed. Measurements included amplitudes of the Q, R, S, J junction and T wave, R-T and U-S intervals and S-T segment slope. These variables are presented as the 10th, 50th (median) and 90th percentiles throughout the testing procedure to define reference values for the electrocardiographic response to maximal treadmill testing. The medians are presented graphically so that the exercise-induced changes can be visualized. In addition, the percent change of R wave amplitude in V5 compared with the supine pretest value is displayed for each subject during and after testing. (Author)

**A82-10633 Computer quantitation of Q-T and terminal T wave /aT-eT/ intervals during exercise - Methodology and results in normal men.** J. O'Donnell, S. B. Knoebel, D. E. Lovelace, and P. L. McHenry (Indiana University; U.S. Veterans Administration Medical Center, Indianapolis, IN). *American Journal of Cardiology*, vol. 47, May 1981, p. 1168-1172. 19 refs. Research supported by the Herman C. Krannert Fund and American Heart Association; Grants No. NIH-HL-06308; No. NIH-HL-07182.

The methods and results of a computerized study of the Q-T interval and T wave of resting and exercise electrocardiograms obtained from normal men are presented. Treadmill exercise tests were performed using a modified Balke protocol in 130 clinically normal men and 25 consecutive QRS-T complexes from standing rest and three exercise stages were computer averaged; measurements of the Q-T interval, the ratio of the Q-T interval to the corrected Q-T interval, and the apex to end of T interval (aT-eT interval) were then made manually and by computer. No significant differences are observed between any of the visual and computer-generated Q-T and aT-eT interval measurements in the X or Z axis leads, although the computer-quantitated measurements in the Z axis lead were systematically longer than those made from the X axis lead. During submaximal exercise, in 63% of the subjects, the Q-T ratio is found to be consistently greater than 1.08, a value previously taken to be a reliable indicator of heart disease. The aT-eT interval is not observed to be dependent on either age or heart rate, indicating that it might be used as a specific indicator of repolarization alterations that occur with myocardial ischemia. A.L.W.

**A82-10749 † Analysis of lung vasomotor responses to alveolar hypoxia and hypercapnia (Analiz, vazomotornykh otvetov v legkikh na alveoliarnuiu gipoksiiu i giperkapniiu).** D. P. Dvoretskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Aug. 1981, p. 1229-1236. 25 refs. In Russian.

The response of pulmonary vessels and the resulting hemodynamics to conditions of reduced oxygen pressure and elevated carbon dioxide in the inspired air are investigated. Experiments measuring the effectiveness of alveolar hypoxia and hypercapnia in increasing pulmonary blood flow resistance, the dependence of vascular responses on blood pH at various alveolar ventilation volumes and the response threshold of pulmonary vessels to hypoxic and hypercapnic stimuli were performed in anesthetized cats under artificial respiration. Results confirm a previously observed inverse relationship between the magnitude of blood flow reduction in lung regions ventilated by hypoxic or hypercapnic gas mixtures and the relative mass of the lung region exposed. An inhibition in vasoconstriction in lung regions hyperventilated with a hypoxic gas mixture is observed which is interpreted as a result of a shift in blood pH toward alkalosis in the zone of respiratory gas diffusion. It is proposed that pulmonary gas exchange is thus a function of respiratory dead space. A.L.W.

**A82-10750 † Glucocorticoid receptors and metabolic disturbances in the liver and heart during immobilization (Gliukokortikoidnye retseptory i metabolicheskie narusheniia v pecheni i serdtse pri immobilizatsii).** A. I. Bobkov and V. P. Kisliakova (Ministerstvo Zdravookhraneniia SSSR, Laboratoriia Radiatsionnoi Endokrinologii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Aug. 1981, p. 1258-1264. 15 refs. In Russian.

The characteristics of the intracellular steroid-receptor interaction and the resultant cellular metabolism of the heart and liver during the compensation and decompensation phases of immobilization stresses are investigated. Determinations of the binding of dexamethasone and corticosterone to cytoplasmic receptors, receptor dissociation constant and binding sites, corticosterone levels, tyrosine aminotransferase activity and metabolite levels in the blood plasma and cytosol were made for 20 rats immobilized on their backs for periods from 30 min to 2 days. A significant increase in plasma and tissue endogeneous glucocorticoid levels accompanied by decreases in glucocorticoid receptor binding and tyrosine aminotransferase activity, a depletion in cellular glucose and cholesterine reserves, a decrease in total plasma and cytosol protein, an increase in plasma and tissue urea and a significant hyponatremia are found to characterize the transition of the stress from the compensated to the decompensated phase. A.L.W.

**A82-10897 * # Development status of a preprototype water electrolysis subsystem.** R. B. Martin (NASA, Johnson Space Center, Crew Systems Div., Houston, TX) and A. C. Erickson (General Electric Co., Wilmington, MA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-9.* 8 p. Members, $2.00; nonmembers, $4.00.

A preprototype water electrolysis subsystem was designed and fabricated for NASA's advanced regenerative life support program. A solid polymer is used for the cell electrolyte. The electrolysis module has 12 cells that can generate 5.5 kg/day of oxygen for the metabolic requirements of three crewmembers, for cabin leakage, and for the oxygen and hydrogen required for carbon dioxide collection and reduction processes. The subsystem can be operated at a pressure between 275 and 2760 kN/sq m and in a continuous constant-current, cyclic, or standby mode. A microprocessor is used to aid in operating the subsystem. Sensors and controls provide fault detection and automatic shutdown. The results of development, demonstration, and parametric testing are presented. Modifications to enhance operation in an integrated and manned test are described. Prospective improvements for the electrolysis subsystem are discussed. (Author)

**A82-10898 * # Application of improved technology to a preprototype vapor compression distillation /VCD/ water recovery subsystem.** K. L. Johnson (Lockheed Missiles and Space Co., Inc., Biotechnology Div., Sunnyvale, CA), R. P. Reysa (Boeing Co., Houston, TX), and D. H. Fricks (NASA, Johnson Space Center, Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-10.* 9 p. Members, $2.00; nonmembers, $4.00.

Vapor compression distillation (VCD) is considered the most efficient water recovery process for spacecraft application. This paper reports on a preprototype VCD which has undergone the most extensive operational and component development testing of any VCD subsystem to date. The component development effort was primarily aimed at eliminating corrosion and the need for lubrication, upgrading electronics, and substituting nonmetallics in key rotating components. The VCD evolution is documented by test results on specific design and/or materials changes. Innovations worthy of further investigation and additional testing are summarized for future VCD subsystem development reference. Conclusions on experience gained are presented. (Author)

**A82-10899 * # Development of an advanced Sabatier CO2 reduction subsystem.** G. N. Kleiner (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) and R. J. Cusick (NASA, Johnson Space Center, Crew Systems Div., Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-11.* 7 p. Members, $2.00; nonmembers, $4.00.

A preprototype Sabatier CO2 reduction subsystem was successfully designed, fabricated and tested. The lightweight, quick starting (less than 5 minutes) reactor utlizes a highly active and physically durable methanation catalyst composed of ruthenium on alumina. The use of this improved catalyst permits a simple, passively controlled reactor design with an average lean component H2/CO2 conversion efficiency of over 99% over a range of H2/CO2 molar ratios of 1.8 to 5 while operating with process flows equivalent to a crew size of up to five persons. The subsystem requires no heater operation after start-up even during simulated 56 minute lightside/39 minute darkside orbital operation. (Author)

**A82-10900 # A regenerative life support system for Space Operations Center /SOC/ - A probable first flight application.** H. F. Brose (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-12.* 8 p. Members, $2.00; nonmembers, $4.00.

The Space Operations Center is an earth-orbiting spacecraft which will be used to test the hardware of a regenerative life support system. This will be the first flight application for the regenerative equipment for recycling oxygen and water and the Environmental Control and Life Support (ECLS) equipment. The ECLS performance requirements (partial pressures, temperature, ventilation, water), design average loads, and required major equipment are presented in detail. The SOC habitat configuration will be designed to provide the crew a safe and comfortable environment in which to perform tasks. Ceiling and floor panels will be removable for access to the air and water processing equipment; the equipment will be packaged so that the components are not more than one layer deep with adequate perimeter access. The ECLS control and display system will provide the information required for easy operation and maintainability, as well as train crew members in the equipment operation. J.F.

A82-10907 * # **Treatment of CELSS and PCELSS waste to produce nutrients for plant growth.** M. Modell, H. Meissner, M. Karel (MIT, Cambridge, MA), J. Carden, and S. Lewis (Georgia Institute of Technology, Atlanta, GA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-19.* 6 p. Members, $2.00; nonmembers, $4.00. NASA-supported research.

The research program entitled 'Development of a Prototype Experiment for Treating CELSS (Controlled Ecological Life Support Systems) and PCELSS (Partially Controlled Ecological Life Support Systems) Wastes to Produce Nutrients for Plant Growth' consists of two phases: (1) the development of the neccessary facilities, chemical methodologies and models for meaningful experimentation, and (2) the application of what methods and devices are developed to the interfacing of waste oxidation with plant growth. Homogeneous samples of freeze-dried human feces and urine have been prepared to ensure comparability of test results between CELSS waste treatment research groups. A model of PCELSS food processing wastes has been developed, and an automated gas chromatographic system to analyze oxidizer effluents was designed and brought to operational status. Attention is given the component configuration of the wet oxidation system used by the studies. O.C.

A82-10908 * # **The potential role of aerobic biological waste treatment in regenerative life support systems.** M. L. Shuler, D. Nafis, and E. Sze (Cornell University, Ithaca, NY). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-20.* 16 p. 12 refs. Members, $2.00; nonmembers, $4.00. Grant No. NsG-2408.

The purpose of the paper is to make a preliminary assessment of the feasibility of using aerobic biological waste treatment in closed systems. Issues that are addressed in this paper are: (1) how high a degree of material balance is possible, (2) how much might such a system weigh, and (3) how would system closure and weight be affected if animals were included in the system. A computer model has been developed to calculate for different scenarios the compositions and amounts of the streams entering or leaving the waste treatment system and to estimate the launch weight of such a system. A bench scale apparatus has been built to mimic the proposed waste treatment system; the experiments are used to verify model predictions and to improve model parameter estimations. (Author)

A82-10909 * # **Ion-exchange chromatography separation applied to mineral recycle in closed systems.** E. Ballou, L. A. Spitze, F. W. Wong (San Jose State University, San Jose, CA), T. Wydeven, and C. C. Johnson (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-21.* 7 p. 10 refs. Members, $2.00; nonmembers, $4.00.

As part of the controlled ecological life support system (CELSS) program, a study is being made of mineral separation on ion-exchange columns. The purpose of the mineral separation step is to allow minerals to be recycled from the oxidized waste products of plants, man, and animals for hydroponic food production. In the CELSS application, relatively large quantities of minerals in a broad concentration range must be recovered by the desired system, rather than the trace quantities and very low concentrations treated in analytical applications of ion-exchange chromatography. Experiments have been carried out to assess the parameters pertinent to the scale-up of ion-exchange chromatography and to determine feasibility. Preliminary conclusions are that the column scale-up is in a reasonable size range for the CELSS application. The recycling of a suitable eluent, however, remains a major challenge to the suitability of using ion exchange chromatography in closed systems. (Author)

A82-10910 * # **Wet oxidation as a waste treatment in closed systems.** B. L. Onisko and T. Wydeven (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-22.* 5 p. 11 refs. Members, $2.00; nonmembers, $4.00.

The chemistry of the wet oxidation process has been investigated in relation to production of plant nutrients from plant and human waste materials as required for a closed life-support system. Hydroponically grown lettuce plants were used as a model plant waste and oxygen gas was used as oxidant. Organic nitrogen content was decreased 88-100% depending on feed material. Production of ammonia and nitrogen gas account for all of the observed decrease in organic nitrogen content. No nitrous oxide (N2O) was detected. The implications of these results for closed life-support systems are discussed. (Author)

A82-10911 * # **Generic waste management requirements for a controlled ecological life support system /CELSS/.** T. Hoshizaki and B. D. Hansen, III (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-23.* 7 p. 12 refs. Members, $2.00; nonmembers, $4.00. Contract No. NAS7-100.

Regenerative life support systems for future space missions will require closure of the waste-food loop. Each mission application will generate specific requirements for the waste management system. However, there are generic input and output requirements that can be identified when a probable scenario is chosen. This paper discusses the generic requirements when higher plants are chosen as the primary food source. Attention is focused on the quality and quantity of nutrients necessary for culturing higher plants. The types of wastes to be processed are also discussed. In addition, requirements generated by growing plants on three different substrates are presented. This work suggests that the mineral composition of waste materials may require minimal adjustment to satisfy the plant requirements. (Author)

A82-10912 * # **Preprototype Vapor Compression Distillation Subsystem development.** C. D. Thompson (NASA, Johnson Space Center, Houston, TX), G. S. Ellis, and F. H. Schubert (Life Systems, Inc., Cleveland, OH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAS-25.* 9 p. 9 refs. Members, $2.00; nonmembers, $4.00.

Vapor Compression Distillation (VCD) has evolved as the most promising approach to reclaim potable water from wastewater for future long-term manned space missions. Life Systems, Inc. (LSI), working with NASA, has developed a preprototype Vapor Compression Distillation Subsystem (VCDS) which processes wastewater at 1.4 kg/h. The preprototype unit weighs 143 kg, occupies a volume of 0.47 cu m, and will reclaim 96 percent of the available wastewater. This unit has been tested by LSI and is scheduled for further testing at NASA-JSC. This paper presents the preprototype VCDS design, configuration, performance data, test results and flight system projections. (Author)

A82-10913 # **Lightside atmospheric revitalization system for Space Shuttle Orbiter.** J. R. Nason and A. K. Colling, Jr. (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-26.* 9 p. Members, $2.00; nonmembers, $4.00.

Lightside Atmospheric Revitalization System (LARS) is a regenerable cabin life support system that can be used for extended duration Orbiter missions. A majority of the system's power usage occurs on the light side of an orbit where power is provided by solar cells. It would replace the baseline lithium hydroxide (LiOH) carbon dioxide removal subsystem, thus eliminating expendables required for carbon dioxide removal. Both oxygen and water required for crew consumption are also conserved. The system consists of three subsystems: a solid amine water desorbed (SAWD) regenerable carbon dioxide removal subsystem, a water vapor electrolysis (WVE) oxygen generating subsystem, and a Sabatier reactor carbon dioxide reduction subsystem. This paper presents a description of LARS, a performance evaluation, and trade-off results compared against the baseline Orbiter LiOH system. (Author)

**A82-10914 * #** **Nitrogen supply system based on hydrazine dissociation.** D. B. Heppner (Life Systems, Inc., Cleveland, OH) and P. D. Quattrone (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-27.* 6 p. 8 refs. Members, $2.00; nonmembers, $4.00.

Future long-duration manned space missions will require a method of generating N2 for cabin leakage makeup and repressurization. Life Systems, working with NASA, is developing a Nitrogen Supply Subsystem (NSS) based on the dissociation of N2H4 into a mixture of H2 and N2. The latter is separated to provide the makeup N2. Recent advances in specific hardware developments have resulted in the design and fabrication of a nominal 3.6 kg/day N2 generation module. The design integrates a N2H4 catalytic dissociator, three ammonia (NH3) dissociation stages and four H2 seperation stages into a 33 kg, 14 cu dm module. A technique has been devised to alternate the NH3 dissociation and H2 separation stages to give high N2 purity in the product stream. Tests have shown the product stream to contain less than 0.5 percent H2 and 20 ppm NH3. This paper discusses the development and test activities of the NSS program. It reviews the design, configuration, operation and projected performance characteristics of a 4.4 kg/day NSS suitable for NASA's planned Space Operations Center. (Author)

**A82-10915 * #** **Regenerable CO2 collection for spacecraft application.** N. Lance, Jr. (NASA, Johnson Space Center, Houston, TX) and F. H. Schubert (Life Systems, Inc., Cleveland, OH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-28.* 8 p. 15 refs. Members, $2.00; nonmembers, $4.00.

The design of the CS-3, a three-person capacity preprototype CO2 collection subsystem, is described. It is noted that the function of the CS-3 is to remove metabolically produced CO2 from the Spacelab cabin to maintain atmospheric pCO2 at 400 Pa or less. Results are presented of an extensive parametric/endurance test program characterizing the subsystem's performance. The results demonstrate the suitability of the electrochemical depolarized CO2 concentration concept for possible use in the Space Operations Center. The CS-3 is found to meet or exceed all Regenerative Life Support Evaluation requirements. Specifically, the 0.13 cu m, 46 kg subsystem is able to remove CO2 at an equivalent rate of 3.4 persons from an air stream having a pCO2 of 400 Pa. C.R.

**A82-10921 * #** **Unconventional processes for food regeneration in space - An overview.** B. O. Stokes, G. R. Petersen, W. W. Schubert, and W. A. Mueller (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-35.* Members, $2.00; nonmembers, $4.00. NASA-supported research.

Alternatives to conventional plant agriculture for the regeneration of food during space missions of extended duration are examined. The options considered, which may be used in combination with conventional agriculture, include the production of food from plant wastes, the chemical synthesis of food from carbon dioxide and other simple molecules or the substitution of edible chemicals, and the use of microrganisms for food and oxygen regeneration, with suitable processing. A comparison of solar energy conversion efficiencies is presented for nonphotosynthetic bacteria grown on hydrogen and algal systems photosynthetically, and it is shown that hydrogen bacteria are potentially more attractive than photosynthetic algae using artificial light. Weight-volume requirements for the conventional plant, algae and hydrogen bacteria systems are also compared to demonstrate the advantages of microbial systems. A.L.W.

**A82-10922 * #** **The CELSS program - An overview of its structure and use of computer modelling.** M. M. Averner (New Hampshire, University, Durham, NH) and R. D. Macelroy (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-36.* 3 p. Members, $2.00; nonmembers, $4.00.

NASA has initiated a research program, CELSS, directed at the acquisition of the knowledge and technology required for the development of an autonomous, regenerative life support system. The program is structured to promote effective, cooperative research in fundamental, applied and engineering science. The initial research thrusts involve investigations into problems of food production, waste processing and system control and integration. In the area of food production both conventional, higher plant-based processes as well as chemosynthetic food production technologies are being investigated. Alternative waste processing procedures, both biological and physicochemical, are being examined. Computer based modelling as an aid to design and analysis is an integral part of the approach to system control and management. A mass balance model depicting the flow of elemental mass in a conceptualized closed, regenerative life support system is described. (Author)

**A82-10923 * #** **A chamber design for closed ecological systems research.** H. Schwartzkopf and P. E. Stofan (New Hampshire, University, Durham, NH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-37.* 5 p. 5 refs. Members, $2.00; nonmembers, $4.00. Grant No. NCC2-27.

A single-plant growth chamber is described which is closed with respect to nutrient and gas flows, in order to serve as a tool in the investigation of control over biological systems. Such control procedures are essential for the use of biological components in the development of a closed ecological life support system (CELSS). The chamber's design consists of two concentric clear plastic cylinders equipped with aeroponic feed tubing, a supporting platform for the plant and a set of sensors that includes an anemometer, thermistors, pressure and strain gauges, and humidity sensors. O.C.

**A82-10924 #** **An approach to the preliminary evaluation of Closed-Ecology Life Support System /CELSS/ scenarios and control strategies.** J. D. Stahr (Bolt Beranek and Newman, Inc., Cambridge, MA), D. M. Auslander, R. C. Spear, and G. E. Young (California, University, Berkeley, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-38.* 7 p. 19 refs. Members, $2.00; nonmembers, $4.00.

An approach to the problem of evaluating CELSS (Closed Ecology Life Support System) scenarios and different strategies within a scenario is presented. The approach combines probabilistic Monte Carlo simulation techniques with the notion of descriptors of system behavior to determine system performance. A simple CELSS model is developed along with two alternative control strategies. The approach is applied to this model to demonstrate the scope and limitations of the method. The simulations show that dynamic behavior and selection of control laws can be crucial to CELSS survival. (Author)

**A82-10925 * #** **Oxygen generation subsystem for spacecraft.** F. H. Schubert, K. A. Burke (Life Systems, Inc., Cleveland, OH), and P. D. Quattrone (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-40.* 9 p. 5 refs. Members, $2.00; nonmembers, $4.00.

Recovery of oxygen from water will be needed on future long-duration manned space missions. An oxygen generation subsystem (OGS) for NASA based on the alkaline electrolyte, static feed water electrolysis concept. Recent advances in hardware development have resulted in the design, fabrication and testing of a self-contained, one-person capacity OGS (WS-1). This subsystem consists of three major parts: a six-cell electrochemical module to generate the product O2, a coolant control assembly to maintain module temperature and a pressure controller which maintains product gas pressures. The subsystem provides 0. 82 kg/d O2 while operating at a current density of 206 mA/ sq cm, a temperature of 339 K and a pressure of 1240 kPa. (Author)

**A82-10927 * #** **Design and control strategies for CELSS - Integrating mechanistic paradigms and biological complexities.** B. Moore, III, R. Kaufmann, and C. Reinhold (New Hampshire, University, Durham, NH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-43.* 7 p. Members, $2.00; nonmembers, $4.00. Grant No. NCC2-27.

Systems analysis and control theory consideration are given to simulations of both individual components and total systems, in order to develop a reliable control strategy for a Controlled Ecological Life Support System (CELSS) which includes complex biological components. Because of the numerous nonlinearities and tight coupling within the biological component, classical control theory may be inadequate and the statistical analysis of factorial experiments more useful. The range in control characteristics of particular species may simplify the overall task by providing an appropriate balance of stability and controllability to match species function in the overall design. The ultimate goal of this research is the coordination of biological and mechanical subsystems in order to achieve a self-supporting environment. O.C.

**A82-10929 * #** **Advanced Microbial Check Valve development.** G. V. Colombo, D. R. Greenley, D. F. Putnam (Umpqua Research Co., Myrtle Creek, OR), and R. L. Sauer (NASA, Johnson Space Center, Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-45.* 4 p. 12 refs. Members, $2.00; nonmembers, $4.00.

The Microbial Check Valve (MCV) is a flight qualified assembly that provides bacteriologically safe drinking water for the Space Shuttle. The 1-lb unit is basically a canister packed with an iodinated ion-exchange resin. The device is used to destroy organisms in a water stream as the water passes through it. It is equally effective for fluid flow in either direction and its primary method of disinfection is killing rather than filtering. The MCV was developed to disinfect the fuel cell water and to prevent back contamination of stored potable water on the Space Shuttle. This paper reports its potential for space applications beyond the basic Shuttle mission. Data are presented that indicate the MCV is suitable for use in advanced systems that NASA has under development for the reclamation of humidity condensate, wash water and human urine. (Author)

**A82-11026** **Hazards of chemicals used in agricultural aviation - A review.** H. R. Quentick and I. C. Perry. *Aviation, Space, and Environmental Medicine,* vol. 52, Oct. 1981, p. 581-5[illegible]. 21 refs.

Aerial agriculture is an industry growing in worldwide use, and will receive even more extensive use in the future where food is in short supply. The aircraft applicator, however, may be subject to the continuous exposure to toxic chemicals over the working season: dinitrophenols, carbamates, organochlorines, and organophosphates. Exposure may never reach an identifiable or detectable chemical level, but subtle behavior changes have been noted. It is recommended that the pilots and ground crews using these pesticides have their individual cholinesterase levels established at the start of the season and monitored at intervals. The recommended lowest levels in blood and plasma are tabulated for the various toxicity classes, and methods of decontamination are discussed. Electromyography is also introduced as a sensitive, quick, and reliable method for measuring toxicity levels. J.F.

**A82-11027** **A comparison between over-the-shoulder and computer-derived measurement procedures in assessing student performance in radar air traffic control.** J. O. Boone and J. A. Steen (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation Space and Environmental Medicine,* vol. 52, Oct. 1981, p. 589-593. 5 refs.

Computer-derived measures (CDM) obtained at the Radar Training Facility in Oklahoma City were compared with over-the-shoulder evaluation (OSE) methods. Two sets of measures were taken: 20 CDMs and an OSE of student performance. It was concluded from regression models that CDMs predict a global rating criterion of potential ATC on-the-job success at least as well as OSE. Further, it was found that OSE is not as reliable as CDM; the CDMs, it appears, can substitute for the OSE ratings and be used to form a composite laboratory score. B.J.

**A82-11028** **Instructor pilot teaching behavior and student pilot stress in flight training.** G. S. Krahenbuhl, P. W. Darst, J. R. Marett, L. C. Reuther, S. H. Constable, M. E. Swinford, and G. B. Reid (Arizona State University, Tempe, AZ). *Aviation, Space, and Environmental Medicine,* vol. 52, Oct. 1981, p. 594-597. 22 refs. Contract No. F33615-78-C-0063.

The purpose of this study was to investigate the relationship between instructor pilot behavior and student pilot stress. Six instructor pilots and 12 undergraduate pilot training students served as subjects. Two students were assigned to each instructor. Ten categories of instructor pilot behavior were coded from audio cassette tapes made during four sorties from the initial instrument phase of undergraduate pilot training in the T-50 Instrument Flight Simulator. Behaviors were tallied and converted to a rate per minute; inter-recorder agreement was 87%. Instructors who relied heavily on acceptance and praise behaviors were placed in a positive group (N = 4), while those relying on criticism and scolding were placed in a negative group (N = 2). Student stress was estimated from timed urine samples used to quantify catecholamine excretion. Results indicated that missions in the T-50 Instrument Flight Simulator produced a significant stress response in the subjects and that the stress response was greater in lessons taught by the instructor pilots in the negative group. (Author)

**A82-11029** **Frequency analysis of EEG in rats during the preconvulsive period of O2 poisoning.** D. Torbati, A. J. Simon, and A. Ranade (Pennsylvania, University, Philadelphia, PA). *Aviation, Space, and Environmental Medicine,* vol. 52, Oct. 1981, p. 598-603. 46 refs. Grant No. NIH-HL-08899-15; Contract No. N00014-76-C-0248.

**A82-11030** **Lack of effect of pulsed ultrasound on the mammalian EEG.** A. Amin, K. R. Foster, S. Takashima (Pennsylvania, University, Philadelphia, PA), and J. Ternes (U.S. Veterans Administration Medical Center, Philadelphia, PA). *Aviation, Space, and Environmental Medicine,* vol. 52, Oct. 1981, p. 604-607. 6 refs. Research supported by the U.S. Veterans Administration; Contract No. N00014-76-C-0642.

Anesthetized rhesus monkeys and rabbits were exposed to pulsed ultrasound from a 1.8 cm diameter transducer placed against the head. Each ultrasonic exposure lasted 4 min; it consisted of a series of 1-2 microsec pulses, with a frequency spectrum broadly centered about the transducer resonant frequency of 1.5 MHz, repeated at a rate of 950 Hz. The time-averaged ultrasonic power was 12.6 mW, with an estimated peak power of about 15 W. No changes were observed in the EEG or its power spectrum during or immediately after the exposure. This contrasts with a previous report of significant changes in the EEG of squirrel monkeys during comparable exposures to pulsed ultrasound. Analysis of the earlier reported results suggests that some of the effects were due to aliasing artifacts. (Author)

**A82-11032** **Retro-hyperflexion luxation - Mechanism of cervical spinal cord contusion injury during ejection sequence.** R. C. Hazzard (U.S. Marine Corps Air Station, Yuma, AZ). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Aylesbury, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 52, Oct. 1981, p. 625, 626.

**A82-11151** **Body fluid and hematologic changes in the toad exposed to 48 h of simulated high altitude.** H. M. Biswas, P. B. Patra, and M. C. Boral (University College of Science, Calcutta, India). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Oct. 1981, p. 794-797. 19 refs. Research supported by the University Grants Commission.

**A82-11152** **Plasma norepinephrine response to exercise before and after training in humans.** F. Péronnet, J. Cléroux, H. Perrault, D. Cousineau, J. de Champlain, and R. Nadeau (Montréal, Université, Montreal, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Oct. 1981, p. 812-815. 36 refs. Research supported by the Haut-Commissariat à la Jeunesse, aux Loisirs et aux Sports, Medical Research Council of Canada, and Quebec Heart Foundation.

**A82-11153** **Factors determining temporal pattern of isobaric supersaturation.** C. Young and B. G. D'Aoust (Virginia Mason Research Center, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 852-857. 12 refs.

In connection with different uptake and elimination rates of inert gases in the body, it is possible to produce transient supersaturations in the body by changing the composition of the inspired gas. If this change occurs at a high pressure, the supersaturation can be sufficient to produce vascular bubbles. A calculation is performed concerning the maximum supersaturations which can occur after a gas exchange. The Krogh cylinder model of the tissues is employed in the analysis. In this model, the tissue is regarded as made up of parallel cylinders with capillaries down the center. To simplify conditions further, it is assumed that there is no gas barrier at the capillary wall. It is found that diffusion plays a role in the transient supersaturation only in long Krogh cylinders with high blood flows. Experiments show that the formation of vascular bubbles after a change of gas composition cannot be entirely explained by the different diffusion constants of the gases used. G.R.

**A82-11154** **Increased hemoglobin-oxygen affinity does not decrease skeletal muscle oxygen consumption.** B. K. Ross and M. P. Hlastala (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 864-870. 23 refs. Grants No. NIH-HL-12174; No. NIH-HL-05372; No. NIH-HL-00182.

The considered investigation is concerned with the role which hemoglobin-oxygen affinity plays in oxygen delivery to tissues, taking into account studies based on the use of an isolated gracilis muscle preparation. A total of 40 mongrel dogs of either sex were employed in the investigation. The results obtained are significant for a definition of the relative importance of the position of the oxygen dissociation curve in gas exchange. It is concluded that the drop in tissue oxygen consumption observed with stored blood and a venous O2 partial pressure of over 40 torr must be due to some factor other than a critically low venous O2 partial pressure. However, the data do not allow a definition of the precise mechanism responsible for the decreased tissue oxygen consumption seen during perfusion with stored blood. G.R.

**A82-11155** **Endurance training in the rat. I - Myocardial mechanics and biochemistry.** D. O. Nutter, R. E. Priest, and E. O. Fuller (Emory University, Atlanta, GA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 934-940. 34 refs. Research supported by the Noble Foundation; Grant No. NIH-HL-16420.

Schaible and Scheuer (1979) have reported increased performance and contractility in isolated hearts from groups of rats trained by running as well as swimming. The current study was performed to further define the effect of endurance training produced by treadmill running, as well as detraining, in both young and adult male rats on myocardial mechanics, cardiac mass, and structural biochemistry. Rats undergoing exercise training were run on a treadmill 5 days/wk for 12 wk. A fixed 8% treadmill grade was used throughout training. The treadmill speed and the running interval were gradually increased over weeks 1-6 and then maintained at 0.82 mph and 60 min for weeks 7-12. It was found that moderate endurance training by treadmill running does not enhance the mechanical performance of the myocardium of either the young or adult rat. The training program did not appear to produce a significant degree of cardiac hypertrophy judging from absolute heart weight and myocardial fiber diameter. G.R.

**A82-11156** **Endurance training in the rat. II - Performance of isolated and intact heart.** E. O. Fuller and D. O. Nutter (Emory University, Atlanta, GA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 941-947. 22 refs. Research supported by the Noble Foundation; Grant No. NIH-HL-16420.

**A82-11157** **Metabolism and thermoregulation during stages of sleep in humans exposed to heat and cold.** E. H. Haskell, J. W. Palca, J. M. Walker, R. J. Berger, and H. C. Heller (California, University, Santa Cruz; Stanford University, Stanford, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 948-954. 31 refs. Grants No. NIH-GM-23694; No. NIH-GM-23695.

**A82-11199** **The electrocardiographic diagnosis of myocardial infarction in the presence of ventricular conduction defects - A new attempt to solve an old problem.** E. A. Lopez, Jr., M. A. Araoye, C. D. McManus, M. J. Goldman, and H. V. Pipberger (U.S. Veterans Administration Medical Center, Birmingham, AL, Durham, NC, Minneapolis, MN, San Francisco, CA, Washington, DC, and West Roxbury, MA; George Washington University, Washington, DC; California, University, San Francisco, CA). *Journal of Electrocardiology*, vol. 14, Oct. 1981, p. 325-332. 31 refs. Research supported by the U.S. Veterans Administration; Grant No. NIH-HL-15047.

**A82-11200** **Noninvasive assessment of T-wave abnormalities on precordial electrocardiograms in middle-aged professional bicyclists.** T. Nishimura, H. Kambara, C.-H. Chen, C. Kawai (Kyoto University, Kyoto, Japan), and Y. Yamada (Kyoto University; Kyoto Medical Association for Prevention of Cardiovascular Disease, Kyoto, Japan). *Journal of Electrocardiology*, vol. 14, Oct. 1981, p. 357-363. 42 refs.

**A82-11539** **Interaction of electromagnetic fields with biological bodies.** K.-M. Chen (Michigan State University, East Lansing, MI). In: Research topics in electromagnetic wave theory. (A82-11526 02-70) New York, Wiley-Interscience, 1981, p. 290-347. 49 refs. NSF Grant No. ENG-74-12603; Grant No. DAAG29-76-G-0201.

A generalized theory is developed for the interaction between an electromagnetic field and a finite heterogeneous body with arbitrary conductivity. The singularity and uniqueness problems associated with the dyadic Green's function in a conducting medium are examined. A numerical method based on an integral equation for the induced electric field inside a biological body irradiated by a far-zone electromagnetic field is applied to quantify the induced electric field and the absorbed power density inside a realistic model of man irradiated by various electromagnetic waves. A similar numerical method based on two coupled integral equations for the induced electric field inside a biological body and the induced current on an antenna is developed to study the coupling between a biological body and an electromagnetic source. Theoretical findings are verified experimentally. V.L.

**A82-11697** † **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

**A82-11924** **Salyut 6 medical monitoring techniques.** J. Powell. *Spaceflight*, vol. 23, Nov. 1981, p. 317, 318.

Equipment and techniques used aboard the Salyut 6 space station to study weightlessness adaptation during prolonged space flights is examined as a means of gaining insight into Soviet approaches to the study of the effects of the zero-g environment. The Polinom 2M apparatus is basically a versatile electrocardiograph, used for simple electrocardiographic examination, the study of the phasic structure of the electrocardiograph, and the recording of cardiograms at compression of the vessels around the tibia, at the right jugular vein, and at the carotid and radial arteries, as well as continuous monitoring for up to 24 h to investigate periodic bioelectric deviations. The Rheograph 2 is designed to measure blood flow in the weightless body at the head, torso, forearm and crus. The Beta instrument is an electrocardiograph covering indices not measured by Polinom 2, using a zonal system for fixing electrodes and sensors at the DS contact. The instruments are designed to be used with the cosmonauts at rest, during exercise, and while wearing a lower body negative pressure suit. Possible future developments include the use of a small experimental centrifuge to determine the optimal amount and duration of artificial gravity to prevent adverse effects of zero-g flight. S.C.S.

A82-12036 # **Biaxial finite deformations of arterial and venous segments under + or - G/z/ acceleration stress.** X. J. R. Avula (Missouri-Rolla, University, Rolla, MO). In: Emerging technologies in aerospace structures, design, structural dynamics and materials; Proceedings of the Aerospace Conference, San Francisco, CA, August 13-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 141-148. 15 refs.

Recent developments in spacecraft and high performance aircraft have resulted in the exposure of the human body to acceleration trauma which manifests itself in circulatory impairment. To aid in the design of life support systems for aerospace maneuvers, the radial and axial deformations of the arterial and venous segments under dynamic fluid loads caused by blood pooling during G/z/ acceleration are calculated. Linearized Navier-Stokes equations for blood flow and equations of large elastic deformation theory for blood vessel deformations are used. The resulting nonlinear partial differential equations, which are coupled, are solved numerically. The proposed scheme is useful to estimate cardiac insufficiency under acceleration stress of the aerospace environment. (Author)

A82-12223 † **Neurophysiological bases for the effects of trace elements (Neiro-fiziologicheskie osnovy deistviia mikroelementov).** V. S. Raitses. Leningrad, Izdatel'stvo Meditsina, 1981. 152 p. 232 refs. In Russian.

The role of trace elements in the functioning of the nervous system is discussed. The concentration and distribution of trace elements in the nervous system are considered, and changes in these concentrations in response to the conditions of basic nervous processes are examined. The role of interoceptors in the regulation of trace element exchanges and the exchange of associated metalloproteids is examined based on experimental results, and the influence of several trace elements on the functioning of the vegetative and central nervous systems and on neuromuscular transmission is discussed. Finally, consideration is given to the use of various trace elements for therapeutic purposes. A.L.W.

A82-12279 † **The effects of space flight factors on the stress reaction of the nuclear nucleic acids in the rat liver (Vliianie faktorov kosmicheskogo poleta na stress-reaktsiiu sistemy iadernykh nukleinovykh kislot pecheni krys).** G. S. Komolova and E. N. Troitskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 260, no. 1, 1981, p. 236-239. In Russian.

A82-12299 † **The effect of adrenergic substances on cardiac activity and brain electrical activity in the rabbit under hypoxia (Deistvie adrenergicheskikh veshchestv na serdechnuiu deiatel'nost' i elektricheskuiu aktivnost' mozga krolikov pri gipoksii).** N. S. Akopian, O. G. Baklavadzhian, G. S. Vartanian, and S. K. Ogmrtsian (Erevanskii Gosudarstvennyi Universitet, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Sept.-Oct. 1981, p. 633-639. 21 refs. In Russian.

A82-12310 **Sarcoidosis and aeronautical risk (Sarcoidose et risque aéronautique).** A. Seigneuric, A. Gay, and G. Leguay (Hôpital d'Instruction des Armées Dominque Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 104-107. 12 refs. In French.

Implications of the diagnosis of sarcoidosis in flight personnel for their future flight status are discussed on the basis of experience in six such cases. All six cases were discovered during routine radiological examinations, of which four were in the first stage requiring no treatment and the remaining two were in the second stage, at which corticoid treatment may be employed to prevent complications or transition to the third stage, in which flight disqualification is inevitable. Conventional means for the diagnosis of sarcoidosis, which are usually used jointly, are identified, and the development of the technique of broncho-alveolar lavage is noted. Consequences of the disease influencing pilot capability are identified, and the problem of determining the flight risks associated with these symptoms are discussed, with particular attention given to the assessment of the risks of cardiac sarcoidosis in patients not displaying myocardial symptoms but who are at a large risk of sudden death. Further studies involving cardiac catheterization to determine the relationship between electrocardiographic abnormalities and sarcoidosis are recommended. A.L.W.

A82-12311 **Aircraft cabin furnishing materials - A toxicological problem (Les matériaux d'aménagement des cabines d'aéronefs - Un problème toxicologique).** P. E. Picart, J. P. Delcroix, and M. Guerbet. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 107-111. 29 refs. In French.

The current state of research on the toxicity of aircraft cabin materials in the event of a cabin fire is reviewed. The evaluation of the dose-response relation which lies at the base of all toxicological studies is discussed, and a distinction is made between lethal and sublethal doses. The laboratory, half-scale and full-scale models of fires used to establish doses and the animal models used to establish physiological and behavioral responses to intoxication are then examined. A distinction is made between studies aimed at ranking materials in order of increasing time to death and those seeking to establish dose-response parameters in order to explain observed phenomena and lead to an improvement in the materials used. It is pointed out that much remains to be done before a simple, reproducible and standardizable method for the classification of materials according to potential danger in the event of a fire can be established. A.L.W.

A82-12312 **Presbyopia in flight personnel - Its repercussions and correction (La presbytie chez le personnel navigant: Ses repercussions - Sa correction.** P. J. Manent, M. Maille, J. C. Ballion, and C. Mauclair (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris; Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 112-115. In French.

The consequences for flight personnel of the development of presbyopia are discussed, and various solutions to the problem are examined. The visual information available to flight personnel from within and outside the vehicle is reviewed, along with the visual strategies associated with visual work in the detection, identification and interpretation of data and the morphoscopic, brightness-discrimination, color-discrimination and spatial aspects of visual physiology. The physiopathology of presbyopia is then presented, and its consequences for visual acuity, the visual field, visual efficiency, oculo-motor equilibrium and visual performance in certain color ranges are identified. Classical solutions to the problems associated with presbyopia represented by unifocal and bifocal lenses are examined, and the advantages of the recently developed progressive bifocal lenses for visual acuity, and visual field are pointed out. Statistical data revealing the prevalence of presbyopia in the general population and in flyers are also presented which demonstrate the importance of the problem. A.L.W.

A82-12313 **The importance of volumetric and anthropometric techniques in the measurement of lean body mass (Intérêt des techniques volumétriques et anthropométriques pour la mesure de la masse maigre).** B. Sesboué, A. Boulier, J. F. Petiot, and J. Fabre (Caen, Centre Hospitalier Universitaire, Caen, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 115-118. 12 refs. In French.

The applicabilities of densimetric and anthropometric approaches to the measurement of lean body mass or, equivalently, percentage body fat, in humans are investigated. Measurements of body volume obtained by a water displacement volumeter and skin fold thicknesses in 13 locations obtained by Harpenden calipers were used to derive body densities and body fat percentages in 52 male and 45 female medical students. Mean percentages of body fat of 15.69 percent and 25.96 percent were obtained from the densitometric data for the males and females, respectively, in agreement with literature data. A step-by-step multiple regression analysis was then used to establish empirical relations for the calculation of fat mass on the basis of four measurements for men and women. The densimetric technique is concluded to be a very important laboratory technique for the determination of body composition, although anthropometric techniques exhibit advantages due to their extreme simplicity. A.L.W.

**A82-12314** **A follow-up on blood pressure in two groups of air traffic controllers (Un follow-up de la tension sanguine chez deux groupes de controleurs de la circulation aérienne).** E. Evrard. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 119-127. 5 refs. In French.

Results are presented of a follow-up study of hypertension in 199 civil and 304 military air traffic controllers. Blood pressure was monitored in the controllers and in assistant controllers not sharing the responsibilities of the controller in an initial examination and at least five times annually afterwards for a period of 6 to 16 years. The proportion of controllers exhibiting excessive levels of blood pressure is found to be small, amounting to 6.53 percent in the civil radar controllers and 3.29 percent in the military controllers. The importance of obesity as well as extraprofessional factors such as nutrition, personal hygeine, physical activity and alcohol consumption in the etiology of the disease is emphasized, and it is concluded that stresses associated with the professional duties of the air traffic controller have no causal or facilitative influence on the development of hypertension. A.L.W.

**A82-12315** **Peripheral chorioretinal lesions and aeronautical flight personnel - Consequences for fitness (Lésions chorio-rétiniennes périphériques et personnel navigant de l'aéronautique - Conséquences sur l'aptitude).** J. C. Ballion and P. J. Manent (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 128-132. 21 refs. In French.

The nature, significance and treatment of peripheral degenerative chorioretinal lesions discovered in flight personnel are discussed. The types of lesions encountered are considered, including lesions of external, middle and internal retinal layers and retinal dehiscences, the latter two of which are capable of giving rise to retinal detachment, and the treatment of these lesions to prevent detachment by means of diathermy, cryotherapy, xenon photocoagulation and laser irradiation is considered. The indications and risks of treatment are discussed, and results of a clinical study of civil and military flight personnel exhibiting retinal degenerations are presented in which 20 percent of the patients diagnosed as having retinal lesions, representing 0.3 percent of the total population examined, underwent prophylactic treatment, rendering them temporarily unfit for duties. In light of the possible consequences of peripheral chorioretinal lesions and their frequency in flight personnel, it is recommended that such personnel be regularly examined by in-depth opthalmoscopy performed by specialists. A.L.W.

**A82-12316** **Aphakia in the flier - Its consequences and correction (L'aphakie du navigant: Ses conséquences - Sa correction).** P. J. Manent, M. Maille, F. G. de Liniers, and C. Mauclair (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris; Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 2nd Quarter, 1981, p. 133-135. In French.

The implications of and possible means of correcting for aphakia resulting from the extraction of a cataractous lens in flight personnel are discussed. The anatomical and functional consequences of lens removal, which results in a decompartmentation of the ocular globe on the one hand and modifications in light and color sensitivity, and hypermetropia on the other, are considered, and the treatment of the condition by the use of eyeglass lenses, contact lenses, and intraocular implants is examined. The fitness of the aphakic flier is then discussed in relation to the anatomical and functional consequences of the surgical intervention, and the mode of correction employed, and it is noted that while contact lenses represent a significant improvement over eyeglasses, allowing the flier to resume flight duties, the perfection of introacular implants would open new possibilities for the aphakic flier. A.L.W.

**A82-12538** **Design, development, and verification of Life Sciences experiments.** C. W. G. Fulcher (Management and Technical Services Co., Houston, TX). In: The year of the Shuttle; Proceedings of the Eighteenth Space Congress, Cocoa Beach, FL, April 29-May 1, 1981. Cocoa Beach, FL, Canaveral Council of Technical Societies, 1981, p. 5-1 to 5-9.

The Life Sciences Flight Experiments Program conducts a continuing coordinated program of biomedical research in space, in order to determine the effects of space flight on man and other organisms, study basic questions in biology, and apply new understanding of such phenomena to the safe and efficient use of space by man. A NASA-industry-academic team has been developed to design, develop, test, and operate Life Sciences payloads for Space Shuttle flights. Ames Research Center works with Lyndon B. Johnson Space Center and NASA Headquarters' Life Sciences Division in the development of scientifically balanced payloads. Life Sciences experiments designated for flight aboard Space-lab-1 include studies of vestibular/space sickness, cardiovascular and cardiopulmonary changes, renal fluid shifts and endocrine control, hematology, and bone-muscle reaction. Reflyable Life Sciences laboratory equipment is also being developed and certified for flight. J.F.

**A82-12648** **Kevlar aramid composites in life-saving equipment.** J. A. Van Haastert and I. Rosenberg (A-T-O, Inc., Scott Aviation Div., Sierra Madre, CA). In: Kevlar composites; Proceedings of the Symposium, El Segundo, CA, December 2, 1980. El Segundo, CA, Technology Conferences, 1980, p. 52-57.

The design and development of a Kevlar safety helmet for aircrew members is described. Noting that high-g forces can increase the weight of a human head with a helmet to 180 lbs, a necessity to reduce weight and retain protective strength was perceived. Helmets possessing twice the tensile strength of fiberglass were fabricated using the same techniques as fiberglass fabrication, and it was found that only anhydride-cured epoxides suffer strength degradation if moisture is present during curing. The use of test laminates with a planned fabric layup system and resin is recommended for Kevlar users. The helmet was trimmed to expand visibility and the visor was aerodynamically reconfigured to produce an airfoil shape with no lift; further improvements are discussed. The importance of upgrading aircrew member safety equipment to keep pace with the increasing sophistication of flight vehicles is stressed. D.H.K.

# STAR ENTRIES

**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3**
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Patricia M. Wallace Sep. 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

**N82-10700*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 4**
**Quarterly Review**
Lyn D. Paulson Dec. 1980 65 p refs
(Contract NASw-3223)
(NASA-CR-164781) Avail: NTIS HC A04/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology, and life sciences and technology. J.M.S.

**N82-10701*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO.1**
**Quarterly Review**
Lyn D. Paulson Mar. 1981 50 p refs
(Contract NASw-3223)
(NASA-CR-164782) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

**N82-10702*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO. 2**
**Quarterly Review**
Lyn D. Paulson Jun. 1981 48 p refs
(Contract NASw-3223)
(NASA-CR-164783) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences and technology. J.M.S.

**N82-10703#** Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
**THE TRACE ELEMENT GEOCHEMISTRY OF MARINE BIOGENIC PARTICULATE MATTER Ph.D. Thesis**
Robert William Collier Feb. 1981 304 p refs
(Contract N00014-80-C-0273; Grant NSF DES-75-03826)
(AD-A095300; WHOI-81-10) Avail: NTIS HC A14/MF A01 CSCL 08/1

Plankton samples were investigated for physical and chemical leaching decomposition to identify the major and trace element composition of particulate carrier phases. The identification of trace element/major element ratios in the biogenic materials was emphasized. The majority of the trace elements in the samples were directly associated with the nonskeletal organic phases of the plankton. Calcium carbonate and opal were not significant carriers for any of the trace elements studied. A refractory phase containing Al and Fe in terrigenous ratios was present in all samples, even from the more remote marine locations. E.A.K.

**N82-10704#** Columbia Univ., New York. Radiological Research Lab.
**RADIATION PHYSICS, BIOPHYSICS AND RADIATION BIOLOGY Progress Report, 1 Oct. 1980 - 30 Sep. 1981**
Jul. 1981 302 p refs
(Contracts DE-AC02-78EV-04733; EP-78-S-02-4733)
(DE81-025259; DOE/EV-04733/T1; COO-4733-4) Avail: NTIS HC A14/MF A01

Separate abstracts were prepared for the 29 papers in this progress report which deal with radiobiological physics, the biological effects of ionizing radiations, and the modification of these effects by chemical and pharmacological agents. DOE

**N82-10705#** Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
**INBORN ANEMIAS IN MICE Progress Report, 1 Aug. 1980 - 1 Jun. 1981**
Seldon E. Bernstein, Jane E. Barker, and Elizabeth S. Russell Jun. 1981 36 p
(Contract DE-AC02-76EV-03264)
(DE81-029128; DOE/EV-03264/20) Avail: NTIS HC A03/MF A01

Four macrocytic anemias, five hemolytic anemias, nonhemolytic microcytic anemia, transitory siderocytic anemia, sex-linked iron-transport anemia, and a target-cell anemia were studied. Each of these blood dyscrasias is caused by the action of a unique mutant gene, which determines the structure of different intracellular molecules, and thus controls a different metabolic process. Each anemia was studied through: characterization of peripheral blood values, determinations of radiosensitivity under a variety of conditions, measurements of iron metabolism and heme synthesis, histological and biochemical study of blood-forming tissue, functional tests of the stem cell component, examination of responses to erythroid stimuli, and transplantation of tissue between individuals of differently affected genotypes. DOE

**N82-10706#** Argonne National Lab., Ill. Chemistry Div.
**MODEL SYSTEMS IN PHOTOSYNTHESIS RESEARCH**
Joseph J. Katz and J. C. Hindman 1980 12 p refs Presented at the 5th Intern. Photosyn. Congr., Halkidiki, Greece, 7-13 Sep. 1980 Submitted for publication
(Contract W-31-109-eng-38)
(DE81-023889; CONF-800963-7) Avail: NTIS HC A02/MF A01

Recently developed models in photosynthesis are described. The Mg-tris(pyrochlorophyllide)1,1,1-tris(hydroxymethyl) ethane triester in its folded configuration is a rudimentary antenna photoreaction center model. Self assembled chlorophyll systems that contain a mixture of monomeric, oligomeric and special pair chlorophyll are shown to have fluorescence emission characteristics. It is suggested that energy transfer between different chlorophyll species in these systems is more complex than previously suspected. DOE

**N82-10707** Tulane Univ., New Orleans, La.
**A HOMEOMORPHIC FINITE ELEMENT MODEL OF IMPACT HEAD INJURY Ph.D. Thesis**
Ronald Richard Hosey 1981 235 p
Avail: Univ. Microfilms Order No. 8118368

A finite element model of the human head and neck, as a system, is presented which incorporates the brain and skull models of previous investigators and a model of the cervical spine into a single model. The exact geometry of the cerebrospinal fluid (CSF) space is included, and morphological continuity of the CSF space and brain material in the region of the head/spine connection is maintained in order that the proper flow of material between the head and spinal cavity may take place during a simulated head impact or whiplash. The 3-dimensional geometry of the brain, spinal cord, CSF space, cervical vertebrae, and the intervertebral disks is defined by means of eight-node, isoparametric brick elements. Dissert. Abstr.

**N82-10708** Loyola Univ., Chicago, Ill.
**THE ROLE OF SKIN TEMPERATURE IN THE CONTROL OF SWEATING IN MAN Ph.D. Thesis**
Thomas Vincent McCaffrey 1981 126 p
Avail: Univ. Microfilms Order No. 8119982

The role of cutaneous thermal receptors in the control of thermoregulatory sweating in men and particularly the specialized role of the head skin temperature in thermoregulatory sweating was investigated. It is suggested that tympanic membrane temperature, and oral temperature, may be affected by thermal exchange occurring between the arteries and veins in the cervical and cephalic regions. Sweating rate increases when head skin temperature increases and when the tympanic membrane and oral temperatures begin to rise. When head skin temperature decreases tympanic membrane and oral temperatures decreases and sweating rate followed the changes in skin temperature as well as the changes in tympanic membrane and oral temperatures. It is shown that head skin temperature is important in determining thermal comfort and sweating rate when compared to other body regions. It is suggested that this sensitivity is in part due to a thermal counter-current exchange between venous blood draining the head and arterial blood ascending to intracranial thermal receptors. Dissert. Abstr.

**N82-10710#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
**A COMPUTATIONAL THEORY OF VISUAL SURFACE INTERPOLATION**
W. E. L. Grimson Jun. 1981 77 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-77-07569)
(AD-A103921; AI-M-613) Avail: NTIS HC A05/MF A01 CSCL 06/4

A computational theory of the interpolation of surfaces from visual information is presented. However, the surface must agree with the information from stereo or motion correspondence, and not vary radically between these points. Using the image irradiance equation, an explicit form of this surface consistency constraints is derived and a functional from the space of functions to the real numbers is required. Conditions on the form of the functional are derived. It is concluded that if the functional is a complete seminorm which satisfies the parallelogram law, or the space function is a semi-Hilbert space and the functional is a semiinner product, then there is a unique surface which is most consistent with the visual information. E.A.K.

**N82-10711#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
**COLOR VISION AND IMAGE INTENSITIES: WHEN ARE CHANGES MATERIAL?**
John M. Rubin and W. A. Richards May 1981 34 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A103926; AI-M-631) Avail: NTIS HC A03/MF A01 CSCL 05/1

A preliminary goal for color vision to determine where changes of material occur in a scene, using only spectral information was analyzed. It is posted that the effects of many processes are confounded with the effects of material changes in the available image intensities and material changes are essentially arbitrary. A unique condition, the spectral crosspoint, allows rejection of hypothesis that measured image intensities arise from one of the confounding processes. Image intensities are measured from regions on opposite sides of an edge. The biological visual system interprets spectral crosspoints across edges as material changes. A circularly symmetric operator is designed to detect crosspoints which resemble the double opponent cell which is commonplace in biological color vision systems. E.A.K.

**N82-10712#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
**EVIDENCE RELATING SUBJECTIVE CONTOURS AND INTERPRETATIONS INVOLVING OCCLUSION**
Kent A. Stevens Jun. 1981 14 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A103925; AI-M-637) Avail: NTIS HC A02/MF A01 CSCL 06/16

Subjective contours, according to one theory, outline surfaces that are apparently interposed between the viewer and background (because of the disruption of background figures, sudden termination of lines, and other occlusion 'cues') but are not explicitly outlined by intensity discontinuities. This theory predicts that if occlusion cues are not interpreted as evidence of occlusion, no intervening surface need be postulated, hence no subjective contours would be seen. This prediction, however, is difficult to test because observers normally interpret the cues as occlusion evidence and normally see the subjective contours. This article describes a patient with visual agnosia who is both unable to make the usual occlusion interpretations and is unable to see subjective contours. He has, however, normal ability to interpret standard visual illusions, stereograms, and in particular, stereogram versions of the standard subjective contour figures, which elicit to him strong subjective edges in depth (corresponding to the subjective contours viewed in the monocular versions of the figures). Author (GRA)

**N82-10713#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
**EQUATION COUNTING AND THE INTERPRETATION OF SENSORY DATA**
W. A. Richards, J. M. Rubin, and D. D. Hoffman 6 Jun. 1981 27 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A103924; AI-M-614) Avail: NTIS HC A03/MF A01 CSCL 06/16

Many problems in biological information processing require the solution to a complex system of equations in many unknown variables. An equation-counting procedure is described for determining whether such a system of equations will indeed have a unique solution, and under what conditions the solution should be interpreted as correct. Three examples of the procedure are given for illustration, one for auditory signal processing and two from vision. Author (GRA)

**N82-10714#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.
**A HUMAN BEING IN THE SEA. PART 2: DEVELOPMENT TRENDS IN SUBMARINE TECHNOLOGY [MAANNISKAN I HAVET 2. UTVECKLINGSTENDENSER INOM UNDERVATTENSOMRAADET]**
Bo Cassel Sep. 1980 37 p In SWEDISH
(FOA-C-58008-H3-Pt-2) Avail: NTIS HC A03/MF A01

Methods and techniques are reviewed for diving applicances including: diving suits for divers exposed to pressure; selfcontained diving apparatus; rigid diving apparatus and diving bells; rescue techniques, especially for long term stays in case of emergency; submarines with crew or without crew; tools; and technical development of the resources of the sea bottom. Description of easily transportable deep underwater diving apparatuses in standard containers is given. Methods to evacuate divers under pressure to pressure-chambers on land are discussed. Author (ESA)

**N82-10715#** Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.
**CADMIUM ANALYSIS IN VIVO [KADMIUM-ANALYS IN VIVO]**
Ronny Bergman Dec. 1980 25 p refs In SWEDISH
(FOA-C-40126-W4(C3)) Avail: NTIS HC A02/MF A01

A method for quick selective analysis of the cadmium content in organs like kidneys and the liver with the use of neutron activation was developed. The method is based on the measurement of prompt gamma radiation emitted by the neutron absorption in the Cd 113 isotope. The sensitivity of the analysis is high. With neutrons in the intermediate energy interval, 1 to 100 KeV, organs at different distances in the body are selectively analyzed. The amount of cadmium in the kidneys of normal people are analyzed with sufficient accuracy so that the dose in the most exposed tissues does not exceed 40 mrad, of which more than half are from gamma rays. With cadmium amounts higher than the normal in the kidney tissues, the doses decrease proportionnaly. Author (ESA)

**N82-10716#** Medical Physics Inst. Utrecht (Netherlands).
**[MEDICAL RESEARCH ACTIVITIES IN THE NETHERLANDS]**
**Progress Report**
B. vanEijnsbergen, ed. and F. H. LopesdaSilva, ed. Dec. 1980 154 p refs
(TNO-MFI-PR-7) Avail: NTIS HC A08/MF A01

Several aspects of medical physics are reported. Topics include: the brain (work on epileptiform transients; recording of responses via implanted electrodes; EEG monitoring during open heart surgery; and models related to the generation of propagated alpha rythmic activity); and the heart and lungs (computerized and microcomputerized) monitoring of parameters. Author (ESA)

**N82-10717#** Department of Agriculture, Washington, D.C. National Economics Div.
**ENERGY EXPENDITURE AND DIETARY CHANGE**
Larry G. Traub and Thomas A. Stucker May 1981 27 p refs

(PB81-218471; AGESS-810512) Avail: NTIS HC A03/MF A01 CSCL 10A

Comparative expenditures for food and costs of energy in the food system under alternative diets was studied. The typer of diet analyzed are: the current average diet consumed; and a diet consistent with specifications of the dietary guidelines. It is shown that the greatest savings under a diet altered to conform with the dietary guidelines is in electrical generation, and the least energy savings in refined petroleum use. GRA

**N82-10718** Ohio State Univ., Columbus.

### CARDIORESPIRATORY RESPONSES AND HANDGRIP ISOMETRIC COMPONENT FOR VARIOUS WHEELCHAIR PROPULSION SYSTEMS Ph.D. Thesis

Douglas Peter Beal 1981 182 p
Avail: Univ. Microfilms Order No. 8115083

Three types of wheelchair propulsion systems for cardiorespiratory responses normal synchronous (sync) handrim propulsion, an asynchronous (async) system of application of force to the handrims, and an arm crank system of propulsion were studied. The static exercise component of the handgrip muscles for these three methods of wheelchair propulsion were compared and a test protocol which measures these variables under equivalent conditions at submaximal and maximal power output (PO) levels, on both able bodied (AB) and wheelchair dependent (WD) subjects was employed. It is found that the static component directly related to the relative intensity of each exercise mode. Similar static components were found for sync and async handrim propulsion, whereas a higher static component was found for arm cracking. It is indicated that the sync propulsion method is slightly more stressful than the async method, and that the arm crank propulsion system significantly reduces the stresses associated with wheelchair locomotion. Dissert. Abstr.

**N82-10719** Florida State Univ., Tallahassee.

### THE EFFECTS OF COLD- AND EXERCISE-INDUCED ALTERATIONS IN SKIN AND CORE TEMPERATURE ON SUBSTRATE MOBILIZATION AND UTILIZATION Ph.D. Thesis

Bernard F. Hurley 1981 134 p
Avail: Univ. Microfilms Order No. 8117944

The effects of altering skin and core temperature by cold exposure and exercise on substrate mobilization and utilization were examined. The significance of the effects of skin and core temperatures on the variables of interest was determined. It is indicated that free fatty acid, glucose, lactate, hemoglobin, and hematocrit concentrations significantly increase during rest when both mean skin temperature and rectal temperature are induced. It is concluded that reductions in both skin temperature and rectal temperature are necessary during cold exposure to produce increases in substrates, hemoconcentration, lactate, and oxygen consumption. Fat mobilization and utilization occurs during exercise in the cold only if reductions in both skin and rectal temperature are produced. Dissert. Abstr.

**N82-10720#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### PHYSIOPATHOLOGY AND PATHOLOGY OF SPINAL AILMENTS IN AEROSPACE MEDICINE [PHYSIOPATHOLOGIE AT PATHOLOGIE DES AFFECTION DUR RACHIS EN MEDECINE AEROSPATIALE]

R. P. Delahaye, R. Auffret, P. Doury, C. Kleitz, A. Leger, G. Leguay, P. J. Metges, J. L. Poirier, B. Vettes, and H. Viellefond Apr. 1981 336 p refs In FRENCH
(AGARD-AG-250-FR; ISBN-92-835-2108-0) Avail: NTIS HC A15/MF A01

Spinal problems in aerospace medicine are reviewed. Opinions are expressed in the areas of etiology, diagnosis and prognosis for lesions in the spinal column, injuries which are activated by piloting rotary wing aircrafts, conventional airplanes, gliders, or by parachute jumping. It is concluded that this information is helpful in aerospace medicine, the medical physiology of flying personnel, and also in the enforcment of flight safety. Transl. by E.A.K.

**N82-10721#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science, Industrial Engineering/Operations Research.

### A MONTE-CARLO SIMULATION INVESTIGATING MEANS OF HUMAN-COMPUTER COMMUNICATION FOR DYNAMIC TASK ALLOCATION

Mark E. Revesman Aug. 1981 39 p refs Presented at the IEEE Intern. Conf. on Cybernetics and Soc., Atlanta, Oct. 1981 Submitted for publication
(Contract N00014-81-K-0143)
(AD-A103890; CSIE-81-1) Avail: NTIS HC A03/MF A01 CSCL 05/8

This paper investigates human-computer communication in multitask decision making situations. It is proposed that tasks in these systems be allocated in a dynamic manner. Communication between human and computer is essential for dynamic allocation to enhance system performance. Simulation experiments investigate two modes of communication: implicit, in which the human's planned actions are relayed to the computer by the use of model of the human's decision strategy , and explicit, in which the human overtly describes his decisions to the computer. Results indicate that implicit communication can significantly enhance system performance if the computer uses a method of decision making which complements that of the human. Explicit communication can greatly enhance system performance, but there is an inherent cost in the time it takes the human to transmit his decisions to the computer. It is concluded that the costs of both methods can be traded off so that either implicit or explicit communication may be useful in different situations. Further research is suggested for defining complementary strategies using human models and for investigating trade-offs between implicit and explicit communication. Author (GRA)

**N82-10722#** Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.

### THE INFLUENCE OF BEARD, BEARD-STUBBLE AND AGE WRINKLES ON THE ADJUSTMENT OF PROTECTIVE MASKS [INVERKAN AV SKAEGG, SKAEGGSTUBB OCH AALDERSRYNKOR PAA SKYDDSMASKTILLPASSNING]

Per-Gunnar Joensson Nov. 1980 32 p refs In SWEDISH
(FOA-A-40034-C2/A2/ B2) Avail: NTIS HC A03/MF A01

Tests were conducted with eight different types of respirators on 31 men, newly shaven and then after 8, 24, 48 and 96 hours of beard growth. Two types of safety devices covering nose and mouth, i.e., four complete gas masks and two with pressurized air, were investigated. With three of these masks a notable worsening in the adjustment is noticeable after only eight hours beard growth. The same eight protective devices were also tested on 20 full-bearded men. No satisfactory protection is recorded. Wrinkled skin can also lead to a less favorable performance. The influence of this factor was tested on 56 retired men and women with two safety devices covering nose and mouth and four different gas masks. The adjustment is significantly less tight than on younger persons. Author (ESA)

**N82-11757*#** National Aeronautics and Space Administration, Washington, D. C.

### CYCLIC NUCLEOTIDES IN TISSUES DURING LONG-TERM HYPOKINESIA

V. F. Makeyeva, G. S. Komolova, I. A. Yegorov, L. V. Serova, and N. A. Chelnaya Oct. 1981 6 p refs Transl. into ENGLISH from "Tsiklicheskiye Nukleotidy v Tkanyakh Pri Dlitelnoy Gipokinezii", Voprosy Meditsinskoy Khimii (USSR), Vol. 27, No. 1, 1981 p 59-61 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Bakh Inst. of Biochemistry, USSR
(Contract NASw-3541)
(NASA-TM-76726) Copyright. Avail: NTIS HC A02/MF A01 CSCL 06C

Male Wistar rates were kept hypokinetic by placing them in small containers for 22 days. Blood plasma cAMP content was subsequently found increased, and cGMP content decreased, in the experimental animals. Liver and thymus cAMP content was similar in the control and experimental animals. There was a 20 and 38% decrease of cAMP content in the kidneys and spleen, respectively. Hypokinesia's reduction of cyclic nucleotides seems to inhibit RNA and protein synthesis. Author

**N82-11758*#** National Aeronautics and Space Administration, Washington, D. C.

### LASER INDUCED FLUOROESCENCE FROM ALGAE: RESULTS OF A SHIP-BORNE FIELD TEST

Britt Hartmann, Ove Steinvall, and Anders Widen Sep. 1981 44 p refs Transl. into ENGLISH of "Laserinducerad Fluorescens from Alger: Resultat fraan ett Baatburet Faeltfoersoek" Rept. FOA-C-30171-EL, Stockholm, Jul. 1979 p 1-51 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by National Defense

(Contract NASw-3541)
(NASA-TM-76626; FOA-C-30171-EL) Avail: NTIS HC A03/MF A01 CSCL 06C

A basis is provided for the feasibility of air-borne laser fluorosensing not only of chlorophyll but also of pollutants such as oils and chemicals. There was a satisfactory correlation between the laser data and those obtained manually. The absolute determination of the chlorophyll concentration is discussed. T.M.

**N82-11759*#** National Aeronautics and Space Administration, Washington, D. C.
**ELECTRON MICROSCOPICAL AND HISTOCHEMICAL STUDIES ON THE TRANSVERSE STRIATED MUSCLES OF BIRDS AFTER PROLONGED HYPOKINESIS**
M. Belak, J. Kocisova, J. Marcanik, K. Boda, and R. Skarda Aug. 1981 14 p refs Transl. into ENGLISH from Arch. Exp. Veterinarmed. (E. Germany) v. 33, no. 1, 1979 p 37-46 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76717) Avail: NTIS HC A02/MF A01 CSCL 06C

Studies of the gastrocnemius muscle were carried out in 4 month old cockerels of the laying hybrid after hypokinesis lasting 15 and 30 days. It was found that restricted movement resulted in dystrophic changes of myofibrils, enlargement of the sarcoplasmic reticulum and oedem of interfibrillar spaces. Histochemical studies revealed focuses of increased activity of non-specific esterase, decreased activity of dehydrogenase of lactic acid and a positive reaction of acid phosphatase. T.M.

**N82-11760*#** National Aeronautics and Space Administration, Washington, D. C.
**PARTICIPATION OF THE HYPOPHYSEAL-ADRENAL CORTEX SYSTEM IN THROMBIN CLEARANCE DURING IMMOBILIZATION STRESS**
B. A. Kudryashov, A. M. Uljanov, F. B. Shapiro, and G. G. Bazazyan Oct. 1981 15 p refs Transl. into ENGLISH from Folia Haematol. (Leipzig), v. 106, no. 2, 1979 p 244-253 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by State Univ. of Moscow
(Contract NASw-3542)
(NASA-TM-76729) Avail: NTIS HC A02/MF A01 CSCL 06C

Thrombin marked with I-131 resulted in a considerable increase of the thrombined clearance rate in healthy male rats during stress caused by an immobilization lasting 30 minutes, and in an increase of thrombin clearance occurred by a combination of immobilization and administration of adrenocorticotropin (ACTH). Contrary to ACTH, the thrombin clearance is not stimulated in healthy animals by hydrocortisone. The results of the examination are presented. S.L.

**N82-11761#** General Accounting Office, Washington, D. C. Community and Economic Development Div.
**INFORMATION OF MISSION AND FUNCTIONS OF THE NATIONAL BUREAU OF STANDARDS**
22 Apr. 1981 96 p
(PB81-228207; CED-81-39) Avail: NTIS HC A05/MF A01 CSCL 05A

The Subcommittee on Science, Research and Technology, House Committee on Science and Technology, was concerned that the Bureau of Standards appeared divided in carrying out its functions under enabling legislation and subsequent legislative mandates and saw a need to hold hearings on the organic act, the law establishing the Bureau. GAO identified several matters which the subcommittee may wish to explore during hearings that may help the Bureau carry out its current and future responsibilities. GRA

**N82-11762** Joint Publications Research Service, Arlington, Va.
**USSR REPORT. LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 12**
30 Oct. 1981 62 p refs Transl. into ENGLISH from various Russian publications
(JPRS-79338) Copyright. Avail: JPRS, Arlington, Va.

A mathematical model of the human memory depository is presented, the investigation of the otolithic reflex and the space perception functions of cosmonauts is described, and requirements for an automated measuring and computing complex for studies in human factors engineering are described.

**N82-11763#** Joint Publications Research Service, Arlington, Va.
**TIME AND INFORMATION MODEL OF HUMAN MEMORY ORGANIZATION**
V. A. Ganzen and D. A. Igonin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 23-33 refs Transl. into ENGLISH from Vestn. Leningr. Univ.: Ekon., Filosofiya, Pravo (USSR), no. 5, issue 1, Mar. 1981 p 47-56
Avail: JPRS, Arlington, Va.

A dimensional and structural model of the human memory depository is presented. Quantitative estimates of the size of the memory depository are made and the organization of the system of memory traces in a hypothetical functional space of the memory is described in psychological terms. In the model, the volume (capacity) of the depository refers to the number of storage units in it, while the concept of structure characterizing the distribution of traces in the depository is interpreted as the structure of order. Only those parts of the depository that are responsible for fixing traces of various forms of symbolic material, such as meaningless syllables, words, or the graphic signs of a written language, are considered. J.D.H.

**N82-11764#** Joint Publications Research Service, Arlington, Va.
**OTOLITHIC REFLEX AND SPACE PERCEPTION FUNCTION OF COSMONAUTS**
I. Ya. Yakovleva and L. N. Kornilova *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 34-38 refs Transl. into ENGLISH from Vestn. Otorino-Laringol. (USSR), no. 4, Jul. - Aug. 1981 p 3-6

Avail: JPRS, Arlington, Va.

The reactions of the vestibular system and the space perception function to space flight are described. Data from preflight and postflight examinations of 24 cosmonauts following ten short term (4-19 days) and five long term (30-175 days) flights was analyzed. The otolithic reflex was investigated according to the intensity of the reaction of eyeball counterrotation, using a visual successive image representation in a transition from vertical to horizontal position to the right and left side. The function of spatial coordinate perception was investigated in the sitting position and in a horizontal position on the right side. J.D.H.

**N82-11765#** Joint Publications Research Service, Arlington, Va.
**MEASURING/COMPUTING COMPLEX FOR AUTOMATION OF ERGONOMIC EXPERIMENTS**
O. V. Afanasyev, R. P. Burusuzov, and B. V. Yelatomtsev *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 41-47 refs Transl. into ENGLISH from Tekh. Estetika (USSR), no. 1, Jan. 1981 p 27-29
Avail: JPRS, Arlington, Va.

Hardware and software requirements for an automated measuring and computing complex for studies in human factors engineering are considered. A complex consisting of a YeS-1010 computer, a Plurimat-S signal analyzer, an experimental camera, and a test bunch consisting of a KL 104A LED indicator, subject console, tachistoscope, and EEG-111 electroencephalograph is described. The software for the computer and signal analyzer is described. J.D.H.

**N82-11766** Royal Aircraft Establishment, Bedford (England). Library.
**ON THE ACTIVE PART PLAYED BY THE HEART IN THE VENOUS RETURN OF THE BLOOD**
W. Bohme Jun. 1980 104 p refs Transl. into ENGLISH from Ergeb. Physiol. (West Germany), v. 38, 1936 p 251-338
(RAE-Lib-Trans-2017; BR79520)

Evidence from X-ray experiments supporting the idea that the heart sucks blood into the atria during systole is reviewed. Both X-ray cinematography and kymography were used in studies on animals and humans with and without contrast media. When the volume of the ventricles decreases during systole, the volume of the atria increases markedly as the valve plane descends towards the apex, the calibre of the venae cavae decreases, and as shown by experiments involving injection of droplets of iodine containing oil, the blood accelerates towards the heart. Various pathological conditions, including respiratory and cardiac failure, pneumothorax, air and oil emboli, and the effects of some pharmacological agents are also discussed. A.R.H.

**N82-11767** Royal Aircraft Establishment, Bedford (England). Library.
**MECHANICAL IMPEDANCE OF THE HUMAN OUTER EAR**
H. Els and J. Schroeter Feb. 1981 21 p refs Transl. into ENGLISH from Forschungsber. (West Germany), no. 238, 1980
(RAE-Lib-Trans-2065; BR80139) Copyright. Avail: Issuing Activity

The lack of a quick, cheap and accurate method of measuring the attenuation provided by hearing protectors hampered the development of these devices. Many efforts to provide such a method involved the design of an objective test apparatus or 'artificial head'. A major drawback to this solution was the lack of detailed information about the mechanical characteristics of the skin/flesh layer at the point of contact between the protector and the head of a wearer. The measurement of the mechanical impedance of the skin/flesh layer of 100 subjects at four points in the circumaural region and at a point in the outer ear canal is described. The application of these data to the design of an artificial skin/flesh layer for use on an 'artificial head' is discussed. T.M.

**N82-11768** Pennsylvania State Univ., University Park.
**AIRWAY GAS MIXING DURING REST AND BICYCLE EXERCISE Ph.D. Thesis**
Deborah Marie Drechsler 1981 96 p
Avail: Univ. Microfilms Order No. 8120419

The increase in dispersion of an inert tracer bolus of helium or sulfur hexafluoride was used as a direct, non-invasive measure of longitudinal gas mixing in the conducting airways. Three types of experiments were performed. Firstly, inspiratory flow rate was varied between 0.2 and 1.8 l/s while the expiratory flow rate was held constant at 0.4 l/s. Measurements were made at penetration volumes (V) of 30, 90, and 150 ml, and tidal volume was 600 ml. The negative correlation of mixing with inspiratory flow rate at all three values of V suggests that airway gas mixing during inspiration is by turbulence. During the second group of experiments expiratory flow rate was varied from 0.2 to 2.5 l/s, and inspiratory flow rate was held constant at 0.4 l/s. The positive correlation of mixing with expiratory flow rate at all three values of V leads to the conclusion that airway gas mixing during expiration is by Taylor diffusion. The third group of experiments investigated the extent of cardiogenic gas mixing by comparing inert gas dispersion during bicycle ergometer exercise at 35 prcent V sub O2 max to that dispersion occurring with matched respiratory maneuvers at rest.
Dissert. Abstr.

**N82-11769** Rochester Univ., N. Y.
**HUMAN LYMPHOCYTE CALCIUM METABOLISM Ph.D. Thesis**
Andrew Harry Lichtman 1981 207 p
Avail: Univ. Microfilms Order No. 8122380

A technique was developed for measuring the calcium content of a small number of cells using a graphite furnace atomic absorption spectrophotometer. The sensitivity of the graphite furnace technique was 60 times higher and the detection limit was 1500 times lower than a conventional flame atomic absorption technique. The low detection limit of the graphite furnace technique permitted studies of calcium metabolism in the available numbers of human lymphocytes. In the absence of serum, the lymphocyte calcium content doubled as the medium calcium concentration was increased from 1 micro mol/l 0.5 mmol/l. At medium calcium concentrations of 0.5 mmol/l and above, the lymphocyte calcium content was 1.0 mmol/l cells. In medium adjusted 2 mmol/l calcium, the lymphocyte calcium content doubled as the medium serum concentration was increased from 0 to 2 percent. At medium serum concentrations of 2 percent and above, lymphocyte calcium content was 2 mmol/l cells. Dissert. Abstr.

**N82-11770*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**LOGIC-CONTROLLED OCCLUSIVE CUFF SYSTEM Patent**
Joseph T. Baker (Technology, Inc., Houston, Tex.), George W. Hoffler, Inventors (to NASA) (Technology, Inc., Houston, Tex.), and William N. Hursta Issued 13 Oct. 1981 6 p Filed 1 Jun. 1976 Supersedes N76-27839 (14 - 18, p 2369)
(NASA-Case-MSC-14836-1; US-Patent-4,294,261; US-Patent-Appl-SN-691647; US-Patent-Class-128-691; US-Patent-Class-128-327; US-Patent-Class-128-686) Avail: US Patent and Trademark Office CSCL 06B

An occlusive cuff system comprises a pressure cuff and a source of regulated compressed gas feeding the cuff through an electrically operated fill valve. An electrically operated vent valve vents the cuff to the ambient pressure. The fill valve is normally closed and the vent valve is normally open. In response to an external start signal, a logic network opens the fill valve and closes the vent valve, thereby starting the pressurization cycle and a timer. A pressure transducer continuously monitors the pressure in the cuff. When the transducer's output equals a selected reference voltage, a comparator causes the logic network to close the fill valve. The timer, after a selected time delay, opens the vent valve to the ambient pressure, thereby ending the pressurization cycle.
Official Gazette of the U.S. Patent and Trademark Office

**N82-11771*#** National Aeronautics and Space Administration, Washington, D. C.
**EFFECTS OF CURATIVE TREATMENT EMPHASIZING ENDURANCE TRAINING ON THE PERFORMANCE AND BLOOD PRESSURE OF HYPERTENSIVE AND NORMOTENSIVES**
F. Worms (Sanitarium of the Governmental Hospital) Jun. 1981 20 p refs Transl. into ENGLISH from Dtsche. Gesundheitswesen, v. 35, no. 31, 1980 p 1207-1212 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76520) Avail: NTIS HC A02/MF A01 CSCL 06P

The problem of normal values of blood pressure after exercise taking into account the blood pressure at the end of the exercise test is discussed. Hypertensives showed a lower working capacity than normotensives. In normotensives, however, systolic blood pressure at the end of an exercise correlated well with the working capacity. After the endurance cure submaximal blood pressure was markedly lower in hypertensives with a striking dependence on the level of initial values. Systolic blood pressure at the end of an exercise test was not changed significantly. Most probably it is not possible to overcome this malregulation in hypertensives by endurance training alone. T.M.

**N82-11772#** Naval Ocean Systems Center, San Diego, Calif. Bureau of Medicine and Surgery.
**REMOTE MEDICAL DIAGNOSIS SYSTEM RMDS DESIGN REVIEW MEETING MINUTES Technical Report, Aug. - Oct. 1980**
W. T. Rasmussen and I. Stevens Aug. 1981 86 p refs Conf. held at Washington, D.C., 27-28 Aug. 1980
(AD-A104555; NOSC/TD-464) Avail: NTIS HC A05/MF A01 CSCL 06/5

Contains the minutes of a design review meeting for the Remote Medical Diagnosis System (RMDS) held 27-28 August, 1980, at the Bureau of Medicine and Surgery (Department of the Navy), Washington, DC. These minutes reflect the discussions held and information exchanged at this review meeting. They paraphrase various discussions, and are not intended as complete verbatim minutes. This document also contains background and reference material on the RMDS project.
Author (GRA)

**N82-11773#** Brookhaven National Lab., Upton, N. Y. Medical Research Center.
**INTERCOMPARISON OF TECHNIQUES FOR THE NON-INVASIVE MEASUREMENT OF BONE MASS**
S. H. Cohn 1981 14 p ref Presented at the 16th European Symp. on Calcified Tissue, Knokke, Belgium, 1981
(Contract DE-AC02-76CH-00016)
(DE81-029921; BNL-29958) Avail: NTIS HC A02/MF A01

A variety of methods are presently available for the measurement of both normal individuals and patients with metabolic disorders. Chief among these methods are radiographic techniques such as radiogrammetry, photon absorptiometry, computer tomography, Compton scattering and neutron activation analysis. In this review, the salient features of the bone measurement techniques are discussed along with their accuracy and precision. The advantages of the various techniques for measuring bone mass are summarized. Where possible, intercomparisons are made of the various techniques. DOE

**N82-11774#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.
**DARTAB: A PROGRAM TO COMBINE AIRBORNE RADIONUCLIDE ENVIRONMENTAL EXPOSURE DATA WITH DOSIMETRIC AND HEALTH EFFECTS DATA TO GENERATE TABULATIONS OF PREDICTED HEALTH IMPACTS**
C. L. Begovich, K. F. Eckerman, E. C. Schlatter, S. Y. Ohr, and R. O. Chester Aug. 1981 79 p refs
(Contract W-7405-eng-26)
(DE81-030434; ORNL-5692) Avail: NTIS HC A05/MF A01

The DARTAB computer code which combines radionuclide environmental exposure data with dodimetric and health effects data to generate tabulations of the predicted impact of radioactive airborne effluents is discussed. DARTAB is independent of the environmental transport code used to generate the environmental exposure data and the codes used to produce the dosimetric and health effects data. The human dose and risk calculations need not be added to every environmental transport code. Options are included in DARTAB to permit the user to request tabulation by various topics. DOE

**N82-11775#** Brookhaven National Lab., Upton, N. Y. Medical Research Center.
**USE OF NUCLEAR RESONANT SCATTERING OF GAMMA RAYS FOR IN VIVO MEASUREMENT OF IRON**
David Vartsky, Lucian Wielopolski, Kenneth J. Ellis, and Stanton H. Cohn 1981 20 p refs Presented at the Conf. on X- and Gamma-Ray Sources and Appl., Ann Arbor, Mich., 10 Jun. 1981
(Contract DE-AC02-76CH-00016; Grant PHS-R01-HL-24177)
(DE81-026051; BNL-29737; CONF-810647-8) Avail: NTIS HC A02/MF A01

A technique for determination of elements in human body in vivo, utilizing nuclear resonant scattering of Gamma rays was developd with this technique 847 keV photons emitted from a gaseous 55MnCl sub 2 source are resonantly scattered from 56Fe present in the body. The detection of these Gamma rays is used to estimate the iron content of the liver or heart of patients. Details of the calibration procedure and potential molecular effects are described. DOE

**N82-11776#** Massachusetts General Hospital, Boston. Radiology Research Lab.
**MOLECULAR EVENTS BASIC TO CELLULAR RADIATION RESPONSE**
G. M. Kolodny [1981] 23 p refs Prepared in cooperation with Beth Israel Hospital, Boston
(Contracts DE-AS02-76EV-03335; EY-76-S-02-3335)
(DE81-027898; DOE/EV-03335/T1; COO-3335-28) Avail: NTIS HC A02/MF A01

The initiation and control of the division process in normal cells to gain insight into changes caused by x-irradiation and neolasia was discussed. It is suggested that small molecular weight RNA acts as primer for new RNA synthesis by hybridizing with DNA and there initiating the transcription of a new RNA chain. It is indicated that small molecular weight RNA will induce the production of new proteins. It is demonstrated RNA taken up from the media by cells in culture and induce in vitro the production of differential cell products. DOE

**N82-11777#** Oak Ridge National Lab., Tenn.
**ALTERED TISSUE REACTIVITY AND INTERACTIONS BETWEEN CHEMICALS**
H. P. Witschi 1981 33 p refs Presented at NRC Workshop on Multichem. Contamination, Milan, 27 Apr. 1981
(Contract W-7405-eng-26)
(DE81-023189; CONF-810491-1) Avail: NTIS HC A03/MF A01

The interaction between chemicals which modify the biological response if exposure is simultaneous or sequential was explored. Two different situations are distinguished where interactions are caused by sequential exposure: (1) a first agent acts as an inducer or inhibitor of mixed function oxidases, this alters the response to a second, challenging agent and the nature of the biological response, is dicated by the second agent; and (2) a first agent produces slight or undetected or undetectable changes in a tissue, exposure to a second agent enhances or allows expression of the biological response determined by the first agent. Both types of interactions require an ordered sequence of exposure to two chemicals and complex dose effect and time effect relationships. DOE

**N82-11778#** North Carolina Univ. at Chapel Hill. School of Medicine.
**NEW APPROACHES TO QUANTITATING THE PULMONARY EFFECTS ON INHALED POLLUTANTS Final Report, 26 Jul. 1977 - 24 Jul. 1980**
Philip A. Bromberg, R. C. Boucher, M. Friedman, M. J. Hazucha, and R. L. Pimmell Jul. 1981 33 p refs
(Grant EPA-R-805164)
(PB81-222382; EPA-600/1-81-052) Avail: NTIS HC A03/MF A01 CSCL 06T

The following techniques described make continuous measurements of large airways caliber rapid methods for invasively measuring respiratory mechanics using forced random noise excitation at the mouth; a nontraumatic technique to measure transepithelial potential difference across respiratory (nasal and airways) epithelium; tracheal epithelial permeability in vivo, demonstrating increased permeability and decreased permselectivity; a rapid noninvasive multigas rebreathing technique to measure lung water and O3 induced pulmonary. GRA

**N82-11779#** Creighton Univ., Omaha, Nebr.
**OZONE EXPOSURE AND PULMONARY METABOLIC EFFECTS OF MEDIATORS AND HORMONES Final Report, 20 Nov. 1976 - 31 Aug. 1980**
Ibert C. Wells Jul. 1981 25 p
(Grant EPA-R-804585)
(PB81-222408; EPA-600/1-81-051) Avail: NTIS HC A02/MF A01 CSCL 06T

Several physiological effects of ozone exposure involving smooth muscle contracting substances were studied. The exposure of rats to ozone concentrations of 0.5 or 1.0 ppm for 4.0 hours produced the following effects in their lungs: (1) the release of prostaglandin F2 alpha and thromboxane A2 (2) increased the angiotensin converting enzyme activity, and (3) decreased the uptake of serotonin from the blood. Histamine and slow reacting substance of anaphylaxis were not released nor was the histamine forming capacity of the lung altered. Succinoxidase activity decreased by short exposure to ozone and increased by long exposure. GRA

**N82-11780#** National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Surveillance, Hazard Evaluations and Field Studies.
**CARBON/GRAPHITE FIBERS: ENVIRONMENTAL EXPOSURES AND POTENTIAL HEALTH IMPLICATIONS**
Ralph D. Zumwalde and Lowell T. Harmison 12 Dec. 1980 21 p refs
(PB81-229692; IWS-52.3) Avail: NTIS HC A02/MF A01 CSCL 06J

Health effects related to carbon (7449440), and graphite (7782425) fiber exposure are discussed. Industrial production of the fibers is reviewed. Data on fiber release and particle size is included. The results of epidemiological and animal toxicologic studies with fibrous glass (14808607), rock wool wollastonite (13983170), fibrous clay, asbestos (1332214) and carbon fibers are described. Animal toxicity tests based on fiber size, deposition pattern and cause of death are recommended. The synergistic effect between carbon/graphite fiber exposure and cigarette smoke also should be studied. Worker exposures to these fibers should be kept as low as possible and managed in the same way as exposure to fibrous glass. GRA

**N82-11781#** Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Directorate of Equipment Engineering.
**INVESTIGATION OF SPATIAL DISORIENTATION OF F-15 EAGLE PILOTS Final Report, 15 Jan. - Aug. 1980**
Dennis W. Jarvi Aug. 1981 72 p refs
(AD-A104684; ASD-TR-81-5016) Avail: NTIS HC A04/MF A01 CSCL 05/8

An extensive investigation, including F-15 pilot interviews at Eglin AFB FL, and Langley AFB VA, into the characteristics and operation of the F-15 Eagle was conducted over a seven month period. In addition, F-16 pilots at Hill AFB UT, were interviewed. The following conclusions were drawn from the information acquired: The F-15 does not possess any unusual flight handling characteristics that could lead to pilot spatial disorientation. The large bubble canopy and the pilot's sitting height in the cockpit generally do not appear to significantly contribute to spatial disorientation. The asymmetrical exterior lighting strips on the F-15 can cause confusion on the part of the wing men regarding his formation position relative to the

lead aircraft or the bank angle of the lead aircraft. Night formation join-ups, particularly from the stern, are rather difficult for the F-15 pilot due to the absence of adequate exterior lighting to provide the necessary depth perception cues for ascertaining the range and attitude of the lead aircraft. The layout of the F-15 cockpit generally manifests adherence to good human factors design principles. The F-15 Spatial Disorientation Team also uncovered some areas of potential pilot distraction. These areas, uncovered during pilot interviews, do not necessarily affect the incidence of spatial disorientation, but may add to the F-15 pilot's workload. The report includes these areas, and also makes a number of recommendations based on the results of the study.
GRA

**N82-11782#** Foster-Miller Associates, Inc., Waltham, Mass. Mining Div.
**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 1: UNDERGROUND COAL MINING Progress Report, Aug. 1979 - Dec. 1980**
D. Randolph Berry and Donald W. Mitchell Jun. 1981 52 p 2 Vol.
(Contract DI-BM-J0199118)
(PB81-225872; BM-OFR-86(1)-81-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 08I

The Bureau of Mines awarded a contract for the provision of recommendations on the safest, most practical methods for complying with new regulations requiring that all underground coal miners have a self-contained, self rescuer (SCSR) -- a device capable of supplying, in an emergency, 1 hour of self-contained oxygen (no breathing of mine air). Information and recommendations that could be used during the early stages of nationwide compliance, especially in the areas of inspection, testing, and underground storage os SCSR's, are presented. An executive summary, introduction, definitions, recommended guidelines for district managers and mine operators, and a storage plan checklist and sample form are provided.
GRA

**N82-11783#** Foster-Miller Associates, Inc., Waltham, Mass. Mining Div.
**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 2: APPENDICES Progress Report, Aug. 1979 - Dec. 1980**
D. Randolph Berry and Donald W. Mitchell Jun. 1981 285 p refs 2 Vol.
(Contract DI-BM-J0199118)
(PB81-225880; BM-OFR-86(2)-81-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 08I

The report covers a discussion of the recommended guidelines, worldwide use of oxygen self-rescuers, hypothetical use of oxygen self-rescuers in post-1972 coal mine explosions and fires, vibration testing of self-contained, self-rescuers (SCSR's), and testing of in-service SCSR's. Discussions with representatives of underground coal mining, recommendations for SCSR storage containers, example of SCSR storage plans, testing of in-service compressed oxygen SCSR's, and 30 CFR 75.1714, 30 regulations pertaining to self-rescuers are presented.
GRA

**N82-11774#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.

**DARTAB: A PROGRAM TO COMBINE AIRBORNE RADIONUCLIDE ENVIRONMENTAL EXPOSURE DATA WITH DOSIMETRIC AND HEALTH EFFECTS DATA TO GENERATE TABULATIONS OF PREDICTED HEALTH IMPACTS**

D. E. Begovich, K. F. Eckerman, [illegible] and [illegible] Aug. 1981 79 p refs

(Contract W-7405-eng-26)

(DE82-003043; ORNL-5692) Avail: NTIS HC A05/MF A01

The DARTAB computer code which combines radionuclide environmental exposure data with dosimetric and health effects data to generate tabulations of the predicted impact of radioactive airborne effluents is described. DARTAB is independent of the environmental transport code used to generate the environmental exposure data and the codes used to produce the dosimetric and health effects data. The [illegible] need not be linked to every environmental transport code. Options are included in DARTAB to permit the user to request tabulations by various organs. DOE

**N82-11775#** Brookhaven National Lab., Upton, N.Y. Medical Research Center.

**USE OF NUCLEAR RESONANT SCATTERING OF GAMMA RAYS FOR IN VIVO MEASUREMENT OF IRON**

David Vartsky, Lucian Wielopolski, Kenneth J. Ellis, and Stanton H. Cohn 1981 20 p refs Presented at the Conf. on X- and Gamma-Ray Sources and Appl., Ann Arbor, Mich., 19 Jun. 1981

(Contract DE-AC02-76CH-00016; Grant PHS-R01-HL-24177)

(DE81-026091; BNL-29725; CONF-810647-8) Avail: NTIS HC A02/MF A01

A technique for determination of iron in human body in vivo, utilizing nuclear resonant scattering of gamma rays [illegible] 847 keV photons emitted from a [illegible] are resonantly scattered from [illegible] present in the body. The [illegible] is used to estimate the iron content of the liver [illegible] patients. Details of the calibration [illegible] effects are described. DOE

**N82-11776#** Massachusetts General Hospital, Boston. Radiology Research Lab.

**MOLECULAR EVENTS BASIC TO CELLULAR RADIATION RESPONSE**

[illegible] 1981 13 p refs [illegible]

(Contract DE-AS02-76EV-03235; EY-76-S-02-3235)

(DE81-027688; DOE/EV/03235/T1; COO-3235-25) Avail: NTIS HC A02/MF A01

The initiation and control of the division process in normal cells [illegible] changes caused by [illegible] hormones [illegible]. It is suggested that small molecular weight RNA acts as primer for new RNA synthesis by hybridizing with DNA and [illegible] the transcription of a new RNA [illegible]. It is indicated that small molecular weight RNA will induce the production of new products. [illegible] taken up from the media by cells in culture [illegible] the production of differentiated cell products. DOE

**N82-11777#** Oak Ridge National Lab., Tenn.

**ALTERED TISSUE REACTIVITY AND INTERACTIONS BETWEEN CHEMICALS**

[illegible] 1981 20 p refs Presented at [illegible] Workshop [illegible], Mich., 21 Apr. 1981

(Contract W-7405-eng-26)

(DE81-023786; CONF-810491-1) Avail: NTIS HC A02/MF A01

The interaction between chemicals which modify the biological response if exposure is simultaneous or sequential [illegible]. Such different situations are [illegible] interactions are caused by sequential exposure: (1) a first agent acts as an inducer or inhibitor of [illegible] the response to a second [illegible] agent and the nature of the biological response is dictated by the second agent, and (2) a first agent produces slight or undetected or [illegible] changes in a tissue; exposure to a second agent enhances or [illegible] expression of the biological response determined by the first agent. Both types of interactions require an ordered sequence of exposure to two chemicals and complex dose effect and time effect relationships. DOE

[illegible]

**N82-11783#** [illegible] Mining Div.

**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 1: UNDERGROUND COAL MINING Progress Report, Aug. 1979 - [illegible] 1980**

D. Randolph Berry and Donald W. Mitchell Jan. 1981 51 p 2 Vol.

[illegible]

The Bureau of [illegible] the necessity of recommendations [illegible] self-contained self-rescuer (SCSR) [illegible] capable of [illegible] self-contained [illegible] and sample [illegible]. [illegible]

**N82-11784#** [illegible] Mining Div.

**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 2: APPENDICES Progress Report, Aug. 1979 - Dec. 1980**

D. Randolph Berry and Donald W. Mitchell Jan. 1981 [illegible]

[illegible]

HC A12/MF A01 [illegible]

The [illegible] worldwide use of oxygen self-rescuers [illegible] training of self-rescuers [illegible] SCSR [illegible] recommendations [illegible] NASA

**N82-11787#** Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Directorate of Equipment Engineering.

**INVESTIGATION OF SPATIAL DISORIENTATION OF F-15 EAGLE PILOTS Final Report, 15 Oct. - Aug. 1980**

Dennis W. Jarvi Aug. 1981 73 p refs

(AD-A104[illegible]; ASD/TR-81-5016) Avail: NTIS HC A04/MF A01 CSCL 05/8

An extensive investigation, including F-15 pilot interviews at Eglin AFB FL, and Langley AFB VA, into the characteristics and causation of [illegible] the F-15 Eagle was conducted over a seven month period. In addition, F-15 pilots [illegible] were interviewed. The following conclusions were drawn from the information acquired: the F-15 does not possess any unusual flight handling characteristics that could lead to pilot spatial disorientation. The large bubble canopy and the pilot's sitting height in the cockpit [illegible] to significantly contribute to spatial disorientation. The [illegible] lighting strips on the F-15 [illegible] the wing [illegible]

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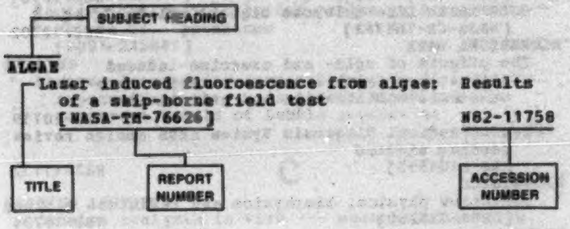

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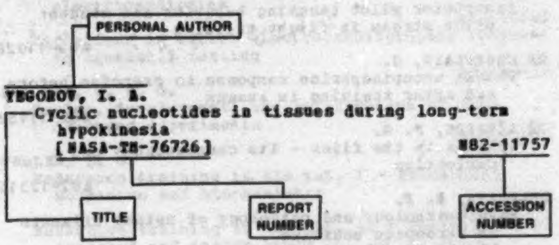

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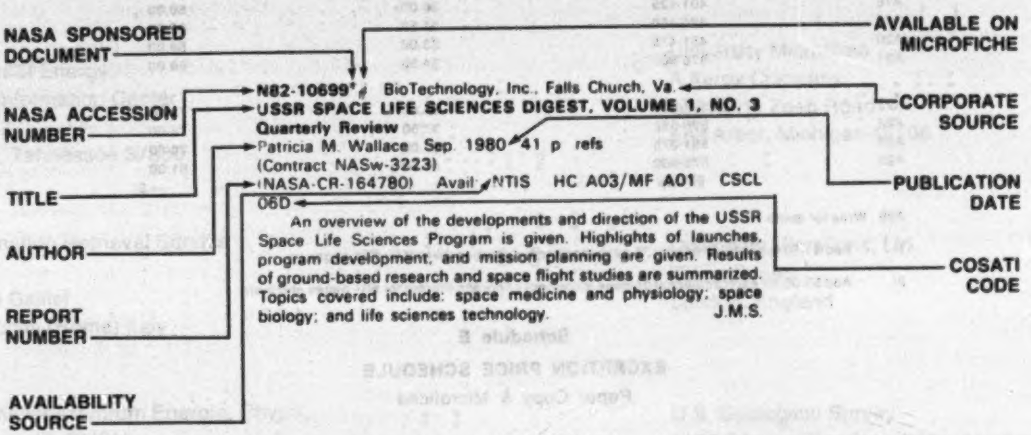

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**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3**
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Patricia M. Wallace Sep. 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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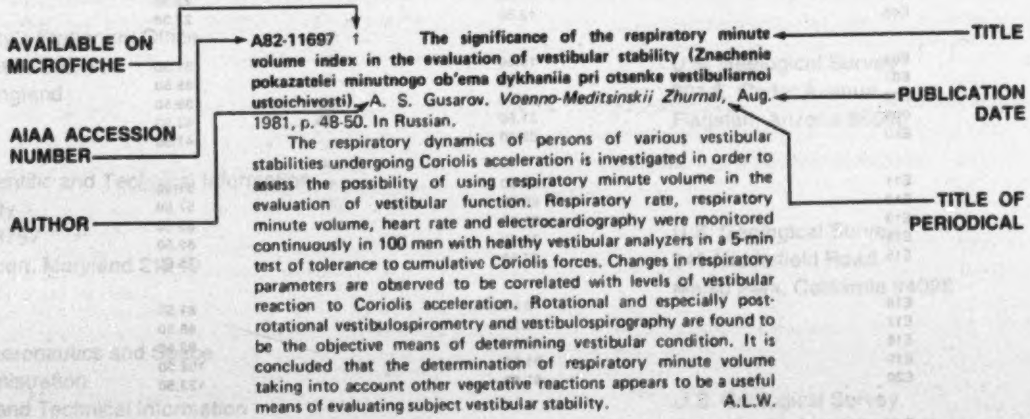

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**A82-11697 #** **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti)**. A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## A Continuing Bibliography (Suppl. 230)

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## IAA ENTRIES

**A82-12869** **Eye movement measurement of readability of CRT displays.** P. A. Kolers, R. L. Duchnicky, and D. C. Ferguson (Toronto, University, Toronto, Canada). *Human Factors,* vol. 23, Oct. 1981, p. 517-527. 15 refs. Research supported by the Department of Communications.

Eye movement was recorded as people read texts presented on a CRT in two different spacings, two different character densities, and at five different scrolling rates. Differences in efficiency of reading single- and double-spacing were statistically significant, but were of little practical significance. Character densities of 35 characters or 70 characters per line favored the smaller-size character with respect to efficiency of reading. Comparison of scrolling rates suggested that the static page was processed more efficiently than was the page scrolled at the subject's preferred rate or at a rate 10% slower than that; pages presented faster than the preferred rate were read more efficiently. Little if any change in preferred rate occurred as a function of practice with 16 pages of text. Systems in which, by program control, text was presented at rates 10% or 20% faster than the preferred scrolling rate should lead to more efficient performance, but might create some problems of user acceptance. (Author)

**A82-12870** **Visual fatigue and cathode ray tube display terminals.** R. R. Mourant, R. Lakshmanan, and R. Chantadisai (Oakland University, Rochester, MI). *Human Factors,* vol. 23, Oct. 1981, p. 529-540. 6 refs. Research supported by Oakland University.

The results of experiments to determine the effects of cathode ray tube (CRT) usage on visual fatigue are reported. Two studies were conducted: two 3-hr sessions, in which subjects were divided into recommended contrast (20) and low contrast (1.61 and 3.18) CRT users and hard copy (5.25 and 2.18 contrast), with a one hour break between sessions; and two 2-hr sessions, with the hard copy contrast at 5.25 and the CRT at 20. The second study was to observe the effects of age, of the presence of a peripheral column of figures, and of blink frequency as an indicator of fatigue. CRT employment was found to have a measurably greater impact on eye fatigue than hard copy reading, although the effects were ameliorated with breaks in the routine. Age did not have a perceptible effect on fatigue; blink rate and outfocus time increased in both tests with the CRT, and the presence of a peripheral column resulted in less fatigue in the two-hour set. Further studies using a larger sample are recommended, as well as regular breaks for CRT users. M.S.K.

**A82-12871** **An evaluation of alphanumeric, graphic, and color information displays.** T. S. Tullis. *Human Factors,* vol. 23, Oct. 1981, p. 541-550. 9 refs.

Four different types of CRT diplay formats were evaluated in the context of a computer-based telephone line testing system. The formats considered were narrative, which used complete words and phrases; structured, which used a tabular format; black-and-white graphics, which used a schematic of the telephone line; and color graphic, which also used a schematic but added color coding. The evaluation measured speed and accuracy of the subjects' interpretation of the displays of test results. Accuracy did not significantly vary with format but speed did. Response times for both graphic formats were consistently shorter than those for the narrative format. With additional practice, however, response times for the structured format were just as short. There was no significant difference between response times for the black-and-white graphic and color graphic formats. (Author)

**A82-12873** **Effects of visual display units on the eyes - A bibliography /1972-1980/.** R. A. Matula (Bell Telephone Laboratories, Inc., Murray Hill, NJ). *Human Factors,* vol. 23, Oct. 1981, p. 581-586. 140 refs.

Visual display units (VDUs) have been reported to cause such eye difficulties as eyestrain, visual discomfort, and visual fatigue. In addition, there are effects on visual accomodation as well as effects arising from contrast and glare sensitivity. This bibliography brings together in one place the widely dispersed literature on the effects of VDUs on the eyes. (Author)

**A82-12874** **The interaction between the edge effect and target conspicuity in visual search.** T. H. Monk (Medical Research Council, Perceptual and Cognitive Performance Unit, Brighton, England). *Human Factors,* vol. 23, Oct. 1981, p. 615-625. 13 refs.

The term 'edge effect' in visual search is used to describe the finding that targets appearing in the outer half of a display have longer search times than those appearing in the inner half. The interaction between the edge effect and target conspicuity was explored using two experiments. Under conditions of target uncertainty, it was shown that the magnitude of the edge effect was unaffected by target conspicuity. In addition, two manipulations of the edge effect indicated that as the edge effect decreased, the difference between the search times of inconspicuous and conspicuous target increased. The results are explained in terms of a model based upon the size of the 'mesh' of fixations used to cover the display. Two computer simulations confirmed that the size of this mesh and the magnitude of the edge effect are inextricably related. (Author)

**A82-12875** **Effects of extended practice on dual-task tracking performance.** D. L. Damos (New York, State University, Buffalo, NY), A. C. Bittner Jr., R. S. Kennedy, and M. M. Harbeson (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). *Human Factors,* vol. 23, Oct. 1981, p. 627-631. 7 refs.

A critical tracking task combination was examined for inclusion in an exotic environment test battery. Performance increased throughout 15 testing sessions despite the subjects' extensive prior tracking experience. However, consistent individual differences occurred only after Session 10. The implications of these results for research on exotic environments and timesharing abilities are discussed. (Author)

**A82-12951** † **Thermoregulatory responses to local convective and radiative cooling (Reaktsii termoreguliatsii na lokal'noe konvektivnoe i radiatsionnoe okhlazhdenie).** L. I. Danilova, N. K. Poleshchuk, and L. A. Fadeeva (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1375-1380. 14 refs. In Russian.

The characterirtics of thermoregulatory responses to various degrees of local skin cooling induced by convection and radiation are investigated. The extents of physical and chemical thermoregulation were assessed by measurements of ear temperature and gas exchange, respectively, in unanaesthetized rabbits subjected to skin temperature reductions of 2-10 C on their dorsal trunk surfaces upon exposure to an ice-salt mixture of temperature -9-14 C or a jet of cooled air. Under both types of cooling stimuli, the level of both types of thermoregulatory response is found to be directly proportional to the cooling stimulus, however the response to radiative cooling is characterized by a slower onset, a longer latency period and a significantly lower ultimate level than the response to the same level of convective cooling. The distinction between the responses is observed to be more pronounced at skin temperature reductions of 7-10 C, indicating the greater danger of insufficient protective adaptation to greater degrees of radiative cooling. A.L.W.

**A82-12953** **Changes in the heat resistance of rats under various regimes of cold adaptation (Izmenenie teplovoi ustoichivosti krys pri razlichnykh rezhimakh kholodovoi adaptatsii).** Iu. I. Rossomakhin and S. A. Pevnyi (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1381-1388. 15 refs. In Russian.

**A82-13110** **Articulated hands - Force control and kinematic issues.** J. K. Salisbury and J. J. Craig. In: Joint Automatic Control Conference, Charlottesville, VA, June 17-19, 1981, Proceedings. Volume 1. New York, American Institute of Chemical Engineers, 1981. 9 p. (TA-2C). 26 refs. Research supported by the California Institute of Technology; NSF Grant No. DAR-78-15914.

Kinematic and control issues are discussed in the context of an articulated multi-finger mechanical hand. Existence of hand designs with particular mobility properties is shown and a definition of accuracy points within manipulator workspace is given. An approach to optimization of the physical dimensions of the JPL-Stanford hand is given. Several architectures for position and force control of this multi-loop-mechanism are described including a way of dealing with the internal forces inherent in such systems. Preliminary results are shown for the joint torque subsystem used in the hand controller. (Author)

**A82-13175** **An empirical relationship for electromagnetic energy absorption in man for near-field exposure conditions.** I. Chatterjee, M. J. Hagmann, and O. P. Gandhi (Utah, University, Salt Lake City, UT). *IEEE Transactions on Microwave Theory and Techniques,* vol. MTT-29, Nov. 1981, p. 1235-1238. 9 refs. Grant No. NIH-ES-02304.

**A82-13226** **Hypoxic vasoconstriction and fluid filtration in pig lungs.** W. Mitzner and J. T. Sylvester (Johns Hopkins University, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1065-1071. 37 refs. Grant No. NIH-HL-10342.

The effects of hypoxic pulmonary vasoconstriction on the fluid filtration rate in isolated blood-perfused pig lungs are investigated under various pulmonary blood flow conditions in a study of the mechanism of high-altitude pulmonary edema. Fluid filtration rates were measured as slow changes in lung weight in lungs inspiring gas mixtures of 200 and 50 mm Hg O2 partial pressures and perfused at blood flows from 0.5 to 2.5 l/min. Pulmonary arterial pressure-flow curves reveal that hypoxia caused a marked vasoconstriction at all blood flow rates, accompanied by an increased rate of fluid filtration. The results may be explained by a simple Starling resistor model of pulmonary circulation consisting of recruitable parallel channels, each with its own critical pressure and filtration coefficient which increase upon exposure to hypoxia. A.L.W.

**A82-13227** **Arm and leg intravascular temperatures of men during submaximal exercise.** L. H. Aulick, S. Robinson, and S. P. Tzankoff (Indiana University, Bloomington, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1092-1097. 24 refs.

**A82-13228** **Effect of exhaustive exercise on myocardial performance.** G. K. Grimditch, R. J. Barnard, and H. W. Duncan (California, University, Los Angeles, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1098-1102. 25 refs.

Possible changes in cardiac functional capacity in the intact heart following prolonged exhaustive exercise are investigated. Cardiac output, coronary blood flow, aortic blood pressure, left ventricular pressure, maximum rate of left ventricular pressure development and maximum rate of left ventricular pressure relaxation were measured in eight chronically instrumented adult mongrel dogs run at a constant work load to exhaustion signalled by the animals' refusal or inability to continue. All cardiovascular parameters, with the exception of stroke volume, are found to increase significantly during the transition from rest to steady-state exercise at about 75% of maximum heart rate. In the transition from steady state to exhaustion, only the maximum rates of left ventricular pressure development and relaxation are observed to increase significantly, while all other values exhibited no significant change. Similarly, no significant changes are observed in measurements of maximum cardiac parameters before and after exhaustion. Results indicate that cardiac function and hemodynamic parameters are not depressed at exhaustion in dogs despite observed ultrastructural changes. A.L.W.

**A82-13229** **Effects of rib cage or abdominal restriction on lung mechanics.** M. Scheidt, R. E. Hyatt, and K. Rehder (Mayo Clinic; Mayo Foundation, Rochester, MN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1115-1121. 14 refs. Grant No. NIH-HL-21584.

The effects of rib cage and abdominal restriction on transpulmonary pressure gradients and lung mechanics are compared. Measurements of transpulmonary pressure were performed simultaneously at three vertical sites in ten healthy male subjects studied under control conditions, rib cage restriction by a corset extended from the axillae to the lower ribs, predominant abdominal restriction by a water-filled rubber bladder secured by a corset extending from the lower ribs to the hips, and conditions making use of a volume equal to the restricted total lung capacity but without the restrictions (mimic phase). At the same lung volumes, abdominal restriction is found to decrease lung height and increase anteroposterior diameter compared with the control case, while rib cage restriction had the opposite effect. Maximum expiratory flow is observed to increase equally with both types of restriction, while the pleural pressure gradient became more uniform with abdominal restriction and the average static elastic recoil pressure increased equally. A significant correlation between total lung capacity reduction and recoil pressure increase is also obtained. Results indicate that changes in lung mechanics depend primarily on the amount of volume reduction rather than the type of deformation producing the reduction. A.L.W.

**A82-13230** **Impaired surfactant phospholipid metabolism in hyperoxic mouse lungs.** N. J. Gross (U.S. Veterans Administration Hospital, Hines, IL) and D. M. Smith (Loyola University, Maywood, IL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1198-1203. 34 refs.

**A82-13231** **Steady-state vascular responses to graded hypoxia in isolated lungs of five species.** M. D. Peake, A. L. Harabin, N. J. Brennan, and J. T. Sylvester (Johns Hopkins Medical Institutions, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Nov. 1981, p. 1214-1219. 31 refs. Research supported by the Peel Medical Research Trust and Wellcome Trust.

In the isolated pig lung exposed to graded levels of hypoxia, steady-state pulmonary vasomotor tone is maximum at an O2 tension, (PO2), of 50 Torr. Below 50-Torr decreases in PO2 cause steady-state tone to fall below this maximum. To determine whether this stimulus-response relation was peculiar to pigs, the steady-state relation between PO2 and vasomotor tone was measured in the isolated lungs of dogs, rabbits, cats, and ferrets, by using identical techniques in each species. Marked species differences were apparent in both the level of PO2 required to elicit responses and the amplitude of the responses. The ferret and the pig had the largest vasoconstrictor responses to hypoxia. No significant responses were obtained in the dog. The cat and rabbit were intermediate responders. In the ferret, cat, and rabbit, the stimulus-response relationship was biphasic, as in the pig. On the average, maximal constriction occurred at a PO2 of 25 Torr. When PO2 was lowered below 25 Torr, steady-state tone fell. Thus pulmonary vasodilation at low PO2 occurs in the isolated lungs of several species. (Author)

**A82-13232** **Pulmonary injury in rats following continuous exposure to 60% O2 for 7 days.** G. Hayatdavoudi, J. J. O'Neil, B. E. Barry, B. A. Freeman, and J. D. Crapo (Duke University, Durham; U.S. Environmental Protection Agency, Research Triangle Park, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Nov. 1981, p. 1220-1231. 34 refs. Grants No. NIH-HL-23806; No. NIH-HL-25044.

Lung injuries and toxic effects associated with the continuous exposure of rats to gas mixtures containing 60% O2 for a period of 7 days are investigated. Biochemical, morphometric and physiological studies were performed on the lungs of animals following a 7-day exposure and of control animals. It is found that exposure to 60% O2 for one week does not induce but rather reduces tolerance to 100% O2 relative to the controls, whereas exposure to 85% O2 prevents mortality in 100% O2 for over 96 hours. Activities of lung superoxide dismutases and glucose-6-phosphate dehydrogenase are observed to be unchanged following exposure to 60% O2, while a decrease in lung compliance is suggested by changes in total lung capacity and the pressure-volume curves of excised lungs. Morphometric analyses reveal a significant decrease in alveolar air volume and increase in the number of alveolar macrophages. The most significant lesions are found to involve the pulmonary vascular bed: decreases in the volume and thickness of the capillary endothelium, pericapillary fluid accumulations, and perivascular edema in the smaller vessels. Results indicate that exposure to O2 causes significant lung injury, primarily in the pulmonary capillary endothelium, without stimulating pathways leading to oxygen adaptation. A.L.W.

**A82-13233** **Autonomic mechanisms of training bradycardia - Beta-adrenergic receptors in humans.** R. S. Williams, R. S. Eden, M. E. Moll, R. M. Lester, and A. G. Wallace (Duke University Medical Center, Durham, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Nov. 1981, p. 1232-1237. 29 refs. Research supported by the Henry T. Kaiser Family Foundation; Grants No. NIH-HL-16037; No. NIH-HL-24146.

The role of beta-adrenergic receptor sensitivity in the development of bradycardia observed at rest and during submaximal exercise as a result of physical training in humans is investigated. Heart-rate responses to graded doses of isoproterenol in seven elite marathon runners were compared with those of seven age-matched controls, and the effects of a 6-week period of intense physical training on lymphocyte beta-adrenergic receptors were monitored in 12 normal volunteers. No significant differences in the dose of isoproterenol required to increase heart rate by 25 beat/min is observed between the marathoners and the controls, either in the absence or presence of cholinergic blockade. Likewise, physical training is found to have no effect either on the number or affinity of lymphocyte beta-adrenergic receptors to binding of l-(H-3)dihydroalprenolol, despite evidence for training bradycardia. Results suggest that although reduced sinus-node responsiveness to isoproterenol during cholinergic blockade may be present in some highly trained individuals, altered neuronal input to the sinus node is usually a more important mechanism of training bradycardia. A.L.W.

**A82-13234** **Central venous bubbles and mixed venous nitrogen in goats following decompression.** B. G. D'Aoust, H. T. Swanson, R. White, R. Dunford, and J. Mahoney (Virginia Mason Research Center, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Nov. 1981, p. 1238-1244. 18 refs. Grant No. NIH-HL-17503.

**A82-13235** **ACTH and cortisol responses to hypoxia in dogs.** H. Raff, S. P. Tzankoff, and R. S. Fitzgerald (Johns Hopkins University; National Institutes of Health, Gerontology Research Center, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Nov. 1981, p. 1257-1260. 21 refs. Grants No. NIH-HL-10342; No. NIH-HL-07199.

**A82-13236** **Hypoxic arousal in intact and carotid chemodenervated sleeping cats.** J. A. Neubauer, T. V. Santiago, and N. H. Edelman (Rutgers Medical School, Piscataway, NJ). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Nov. 1981, p. 1294-1299. 26 refs. Grant No. NIH-HL-16022.

The relative contributions of the carotid chemoreceptors and hyperpnea to arousal from sleep under hypoxic conditions are investigated in intact and chemodenervated cats. The arousal response to hypoxic hypoxia was first characterized in 14 intact sleep-deprived cats breathing a mixture of 5% O2 in N2 during periods of REM and slow-wave sleep (SWS), then compared with responses to carboxyhemoglobinemia induced by a 6% CO in 40% O2 breathing gas mixture and to the same hypoxic hypoxia following the bilateral surgical denervation of the carotid chemoreceptors. During a period of SWS unassociated with spontaneous arousals, arousal is found to occur at arterial oxygen saturations which are nearly the same in intact hypoxic and carboxyhemoglobinemic cats and carotid denervated cats, while arousal from REM sleep occurred after twice as much time and required a greater degree of hypoxemia. During both SWS and REM sleep, inhalation of hypoxic oxygen mixtures caused a substantial increase in ventilation in intact animals, while 6% CO did not. Results indicate that some mechanism other than one involving stimulation of the carotid bodies or increased ventilation is responsible for hypoxic arousal, and that the mechanism is stimulated by lowered O2 saturation. A.L.W.

**A82-13289** * # **Veiling glare reduction methods compared for ophthalmic applications.** D. R. Buchele (NASA, Lewis Research Center, Cleveland, OH). *Applied Optics*, vol. 20, Nov. 1, 1981, p. 3787-3791. 11 refs.

Veiling glare in ocular viewing was simulated by viewing the retina of an eye model through a sheet of light-scattering material lit from the front. Four methods of glare reduction were compared, namely, optical scanning, polarized light, viewing and illumination paths either coaxial or intersecting at the object, and closed circuit TV. Photographs show the effect of these methods on visibility. Polarized light was required to eliminate light specularly reflected from the instrument optics. The greatest glare reduction was obtained when the first three methods were utilized together. Glare reduction using TV was limited by nonuniform distribution of scattered light over the image. (Author)

**A82-13422** **The effect of visual-vestibular conflict on the latency of steady-state visually induced subjective rotation.** S. C. P. Wong and B. J. Frost (Queen's University, Kingston, Ontario, Canada). *Perception and Psychophysics*, vol. 30, no. 3, Sept. 1981, p. 228-236. 31 refs. Research supported by the Natural Sciences and Engineering Research Council and Medical Research Council of Canada.

It has been hypothesized that the 25- to 30-sec latency observed in the onset of subjective rotation when a stationary subject is presented with a rotating visual field is the result of visual-vestibular conflict. The paper presents two experiments designed to test whether a reduction in visual-vestibular conflict would reduce the length of the latency period. In the first experiment, subjective rotation was induced by rotating a tall striped drum around an observer sitting in line with its axis of rotation, and vestibular stimulation was provided by the brief rotary acceleration of the observer's chair. Onset latencies were found to be significantly shortened by corroborating vestibular stimulation in the direction of perceived rotation, but to be unaffected by noncorroborating vestibular stimulation. In the second experiment, patients with unilateral (right labyrinth) Meniere's disease, which produces decreased vestibular sensitivity to rightward body rotation, were tested in the same rotating drum apparatus without additional chair rotation, and it was found that the latency to steady-state subjective rotation to the right was shorter than normal, while a level of subjective rotation to the left comparable to that of normal subjects was not reached during the 1-min testing period. Results thus confirm the hypothesis that onset latency of subjective rotation is probably a function of the visual-vestibular conflict. A.L.W.

**A82-13423** **The effects of binocular and motion-generated information on the perception of depth and height.** M. A. Hagen (Boston University, Boston, MA) and M. Teghtsoonian (Smith College, Northampton, MA). *Perception and Psychophysics*, vol. 30, no. 3, Sept. 1981, p. 257-265. 21 refs. Grants No. NIH-R01-MH-27947-0; No. NIH-1-R0-HD-10857.

The contributions of binocular vision and heat movements to the perception of distance and size in the presence of optical gradient information is investigated. Subjects were asked to make distance and size judgements by the adjustment of a metal tape for target triangles of various sizes placed within a 2.4-m alley with a black, white and gray checked floor and white walls. When judged distance is fitted as either a linear or a power function or target distance, it is found that binocular information is able to reproduce actual target distances than monocular vision, although consistently underestimating them, while head motion did not have any effect on perceived distance. Size judgements are not observed to be influenced by either binocular vision or head motion, consistently exceeding target heights by an average 30 to 40%. Analysis of judged size as a function of target distance reveals that the effect of distance is to increase size judgements for all conditions but monocular view with head motion. The distance judgements support the hypothesis that the binocular stimulus carries information that the monocular stimulus does not, while the size judgements suggest an independence of perceived size from perceived distance. A.L.W.

**A82-13550** † **The application of a combined passive orthostatic test in the flight medical examination (Primenenie kombinirovannoi passivnoi ortostaticheskoi proby vo vrachebno-letnoi ekspertize).** V. D. Vlasov and A. S. Nakhaev. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 49, 50. In Russian.

The potential applicability of a combined passive orthostatic test incorporating both orthostatic and antiorthostatic positions to the medical examination of pilots is assessed. Systolic, diastolic and pulse blood pressures and heart rate were measured in subjects undergoing a combined orthostatic test consisting of 5-min periods in the horizontal, antiorthostatic (-30 deg inclination) and orthostatic (+80 deg inclination) positions, or a control test involving 5 min in the horizontal and orthostatic positions. In the combined orthostatic test, a decrease in arterial systolic pressure, an increase in diastolic pressure, a decrease in pulse pressure and an increase in heart rate relative to those observed in the horizontal position were observed in the orthostatic position, while in the control tests, only an increase in heart rate was observed. The combined orthostatic test is thus seen to produce a more marked cardiovascular response and to merit further investigation as an alternative to the conventional passive orthostatic test used in pilot examination. A.L.W.

**A82-13636** † **The theory of radiometric contact measurements of the internal temperature of bodies (K teorii kontaktnykh radiometricheskikh izmerenii vnutrennei temperatury tel).** V. S. Troitskii (Nauchno-Issledovatel'skii Radiofizicheskii Institut, Gorki, USSR). *Radiofizika,* vol. 24, no. 9, 1981, p. 1054-1061. 6 refs. In Russian.

The paper considers the problem of determining the internal temperature of a body by measuring its thermal emission by a radiometer that is in contact with the surface of the body. A method is proposed for the absolute measurement of the internal temperature of dielectric bodies, including certain parts of the human body. An analysis is presented of radiometer input noise as a source of measurement errors. It is shown that the use of the thermodynamic-equilibrium principle of the radiometer input system and calibration with respect to two thermal-emission standards makes it possible to reduce the measurement error to one-tenth of a degree. B.J.

**A82-13699** † **Artificial hypobiosis as a stable functional state of reduced vital activity (Iskusstvennyi gipobioz kak ustoichivoe funktsional'noe sostoianie snizhennoi zhiznedeiatel'nosti).** N. N. Timofeev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 52-76. 92 refs. In Russian.

The artificial induction of a state of hypobiosis corresponding to true hibernation in warm-blooded animals is discussed. Following a discussion of distinctions between natural and artificial levels of reduced vital activity, including superficial, deep and superdeep states of hypobiosis, attention is given to the induction of deep hypobiosis by the hibernation method, which consists of the administration of neuroplegic substances, and by the oxycapnic method, which involves the use of hypoxic and hypoxic-hypercapnic gas mixtures. Experimental results are considered which reveal the relationships characterizing the adjustment of the central and vegetative nervous systems, energy and carbohydrate-liquid metabolism, enzyme activity and tissue and organ morphologies to reduced levels of activity at lower temperatures. It is noted that the results demonstrate the feasibility of achieving reversible states of hypobiosis similar to those observed in heterothermic animals in warm-blooded animals. A.L.W.

**A82-13700** † **Oxygen deficiency in tissues and their blood supply (Defitsit kisloroda v tkaniakh i ikh krovosnabzhenie).** M. I. Gurevich, S. A. Bershtein, and A. I. Solov'ev (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 77-98. 109 refs. In Russian.

The role of oxygen in regulating vascular tonus, which in turn determines tissue blood supply, is discussed based on an analysis of literature data. It is shown that the functioning of smooth muscle cells, which determine vascular tonus, primarily results from fluctuations in the level of intercellular metabolism and energy consumption in the provision of a specific level of force commensurate with that of striated muscle, and from aerobic metabolism in the synthesis of high-energy phosphates. Data demonstrating the significant reduction of the electrical, humoral and contractile activity of smooth vascular muscle and its responses to electrical, humoral and mechanical stimuli upon the lowering of the perfusate oxygenation level is presented, and it is concluded that these muscles exhibit reduced excitability under oxygen deficiency, possibly due to the reduction of energy supply to the electrogenic ion pump. The vascular smooth muscle cells thus act as chemoreceptors with built-in contractile mechanisms. A.L.W.

**A82-13825** # **On the place of organic life in the universe and the possibility of extraterrestrial life.** R. N. Butler (University College, Galway, Ireland). *Irish Astronomical Journal,* vol. 14, Mar.-June 1981, p. 177-188. 42 refs.

Assessments of the possibility of life elsewhere in the universe are thought to be unduly optimistic, representing a generalization of a single data point, the earth. Some of the assumptions involved in this post-Copernican philosophical view of widespread life in the universe are examined. It is pointed out that if it is to be justifiably assumed that life is a universally occurring process rather than a universally possible process, which has occurred rarely, it must be required (a) that the process be understood; (b) that the chance element involved be quantified; and (c) that the limits of favorable conditions be identified and shown to be reasonably widespread. The role of chance and probability in the development of earthlife, however, cannot be accurately quantified and probably will never even be fully known. C.R.

**A82-13839** **A working hypothesis on the interdependent genesis of nucleotide bases, protein amino acids, and primitive genetic code.** F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan). *Origins of Life,* vol. 11, Sept. 1981, p. 197-202. 22 refs.

**A82-13840** **Are there structural analogies between amino acids and nucleic acids.** L. B. Hendry, E. D. Bransome, Jr. (Georgia, Medical College, Augusta, GA), and M. Petersheim (Rochester, University, Rochester, NY). *Origins of Life,* vol. 11, Sept. 1981, p. 203-221. 55 refs.

Space-filling molecular models have been used to examine structural analogies between amino acids and nucleic acids. The three-dimensional structures of amino acid R groups appear to be stereochemically related to cavities formed by removal of single bases in double helical nucleic acids. The common L amino acids may thus be complementary to their codons. (Author)

**A82-13841** **Molecular complexes of amino acids with porphyrins as possible precursors of pigment-protein systems.** M. P. Kolesnikov, N. I. Voronova, and I. A. Egorov (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Origins of Life,* vol. 11, Sept. 1981, p. 223-231. 20 refs.

The present communication gives experimental results of the studies of catalytic and photochemical properties of peptide-like compounds containing metalloporphyrins (hemoproteinoids and molecular complexes obtained through adsorption of prophyrins and amino acids on volcanic ash). The data suggest that molecular complexes of amino acids with porphyrins could have evolved in the course of chemical evolution and were intermediated between abiogenically synthesized molecules of amino acids and porphyrins and pigment-protein systems of living organisms. (Author)

**A82-13842** **Constant AMP synthesis in aqueous solution by electric discharges.** Y. Yamagata, T. Mohri, M. Yamakoshi, and K. Inomata (Kanazawa University, Kanazawa, Japan). *Origins of Life,* vol. 11, Sept. 1981, p. 233-236.

An electric discharge was made through a gas mixture of $N_2$ (7 cm Hg), $H_2$ (14 cm Hg) and $CO_2$ (14 cm Hg) over an aqueous solution (100 ml, pH 7.6) of adenosine (0.02 M) and phosphate (0.2 M) in a 5 liter vessel simulating primitive earth conditions. AMP was produced at a constant rate in the solution, and the yield reached about 2% in two months. (Author)

**A82-13843 *** **Effect of polynucleotides on the dimerization of glycine.** H. Mizutani and C. Ponnamperuma (Maryland, University, College Park, MD). *Origins of Life,* vol. 11, Sept. 1981, p. 237-241. 9 refs. Grant No. NGR-21-002-317.

Results from experiments to determine the effect of polynucleotides on abiological formation of peptide bonds are reported. The reaction between glycine molecules in an aqueous phase in the presence of a condensing agent was chosen as a model, with polyphosphates being selected as the condensing agent for biologically relevant peptide formation. Four types of polynucleotides were used: polygluanic acid (G), polyuridic acid (U), polyadenylic acid (A), and polycytidylic acid (C); the effects of small anions, acetate, chloride, and phosphate, were also studied. Procedures are given, including concentrations, pH, and incubation time, and the type of amino acid analyzer. The diglycine yields were, in order of most to least: G, C, A, U, and are diagrammed as a function of time; rate of formation followed the same order of magnitude as the final yields. Anion presence displayed no discernible effect. The results are taken to indicate that polynucleotides do have an effect on the formation of peptide bonds, an effect significant in the understanding of chemical evolution. M.S.K.

**A82-13844** **Primordial transport of sugars and amino acids via Schiff bases.** W. Stillwell and A. Rau (Indiana University; Purdue University, Indianapolis, IN). *Origins of Life,* vol. 11, Sept. 1981, p. 243-254. 58 refs.

Experimental support is given for a model concerning the origin of a primordial transport system. The model is based on the facilitated diffusion of amino acids stimulated by aliphatic aldehyde carriers and sugars stimulated by aliphatic amine carriers. The lipid-soluble diffusing species is the Schiff base. The possible role of this simple transport system in the origin of an early protocell is discussed. (Author)

**A82-13845** **Chirality of electrons from beta-decay and the left-handed asymmetry of proteins.** A. K. Mann and H. Primakoff (Pennsylvania, University, Philadelphia, PA). *Origins of Life,* vol. 11, Sept. 1981, p. 255-265. 10 refs. NSF Grant No. PHY-78-11608; Contract No. EY-76-C-02-3071.

A simplified mathematical model of the origin of the left-handed asymmetry of proteins in living matter is presented. The model is based on the hypothesis of Vester and Ulbricht (1957) that the chirality of (left-handed) electrons from naturally beta-active elements, e.g. C-14, K-40, etc., was the specific source of the asymmetry; it requires for its application data on the interaction of electrons having nonzero chirality with racemic mixtures of amino acids. This interaction is here treated theoretically in an order-of-magnitude calculation. The analysis yields a very approximate value of the induced steady-state asymmetry in the amino acids at the beginning of protein synthesis and indicates that this asymmetry, though small, may have been sufficient to account for the dominant left-handedness of proteins now observed. (Author)

**A82-13846 *** **Chemical evolution and the origin of life - Bibliography supplement 1979.** L. G. Pleasant (George Washington University, Medical Center, Washington, DC) and C. Ponnamperuma (Maryland, University, College Park, MD). *Origins of Life,* vol. 11, Sept. 1981, p. 273-288. 340 refs. Contract No. NASw-3165; Grant No. NGR-21-002-317.

**A82-13890** # **A self-contained, man-borne biomedical instrumentation system in the flight testing of naval weapons systems.** D. W. Call, D. M. Kelly, and D. G. Robertson (U.S. Navy, Pacific Missile Test Center, Point Mugu, CA). *AIAA, SETP, SFTE, SAE, ITEA, and IEEE, Flight Testing Conference, 1st, Las Vegas, NV, Nov. 11-13, 1981, AIAA Paper 81-2403.* 5 p. 8 refs. Navy-supported research.

Noting that the performance capabilities of some existing and prototype military aircraft exceed human physical tolerances and reaction times, a self-contained, man-borne, in-flight physiological data acquisition system (IFPDAS) was developed to evaluate airborne man-machine systems. A short history of in-flight monitoring of fighter pilots is provided, tracing the expansion of the instrumentation. IFPDAS has capabilities of monitoring physiological and environmental data for recording on cassette tape; ECG, expiratory flow, $O_2$ inhalation/exhalation, g-force, vertical acceleration, cabin pressure, voice information, and a time code are included. Sensors are contained within the pilots' survival vests, and tests have been conducted on board A-4, F-4, F-14, C-130, and T-38 aircraft. Breathing levels during landing were found to surpass breathing apparatus design parameters. IFPDAS is equipped with 12 channels analog and 32 digital, which are multiplexed on four track magnetic tape for up to four continuous hours. D.H.K.

**A82-13914** # **System to measure head motion during parachute opening shock.** T. J. Bozack and J. E. Doerr (U.S. Naval Weapons Center, China Lake, CA). *AIAA, SETP, SFTE, SAE, ITEA, and IEEE, Flight Testing Conference, 1st, Las Vegas, NV, Nov. 11-13, 1981, AIAA Paper 81-2517.* 10 p. 12 refs.

Human tolerance limits to the forces imposed during parachute opening are not well defined. Part of the effort to develop realistic human tolerance limits involves measuring the response of the human, head-neck system to the forces imposed during parachute opening. To accomplish this, human subjects are being instrumented to directly measure the displacement of the head with respect to the upper torso during parachute opening. A small high speed 16-mm camera is mounted on a test jumper and fiber-optic image guides connect the camera to a pair of stereo lenses. This system photographs head motion during parachute opening. A mathematical description of motion is derived from an analysis of the stereo film. (Author)

**A82-14197 *** **Hydrazines and carbohydrazides produced from oxidized carbon in earth's primitive environment.** C. E. Folsome, A. Brittain (Hawaii, University, Honolulu, HI), A. Smith, and S. Chang (NASA, Ames Research Center, Life Sciences Div., Moffett Field, CA). *Nature,* vol. 294, Nov. 5, 1981, p. 64, 65. 15 refs. Research supported by the University of Hawaii, Grant No. NGR-12-001-109.

Whether abiological organic compounds can be formed from the interactions of energy sources with nitrogen, oxidized carbon and water is held to be of importance in geochemical models of the primordial earth atmosphere. It is reported that experiments using quenched spark discharges through molecular nitrogen on aqueous suspensions of $CaCO_3$ and other reactants to simulate the hydrosphere/atmosphere interface yield hydrazine and carbohydrazine in significant but low yields. Such reactions in primitive aquatic environments may have supplied a pathway for chemical evolution and the origin of life, on a primitive earth in which fully oxidized states of carbon were available for the primary synthesis of organic matter. O.C.

**A82-14274** **Work and rest on nuclear submarines.** A. N. Beare, K. R. Bondi (U.S. Naval Material Command, Naval Submarine Medical Research Laboratory, Groton, CT), R. J. Biersner (U.S. Naval Medical Research and Development Command, Bethesda, MD), and P. Naitoh (U.S. Navy, Naval Health Research Center, San Diego, CA). *Ergonomics,* vol. 24, Aug. 1981, p. 593-610. 30 refs.

Hours of work and sleep were recorded in daily activity logs by 46 enlisted men on two fleet ballistic missile submarines during routine patrols. Total working time (watch standing, nonwatch work, and study) averaged 12 hours a day. Daily sleep time averaged 8.4 hours a day on one ship and 7.6 on the other. Sleep was mildly fragmented in that the men averaged 1.3 sleep episodes, of somewhat less than 6 hours duration, in 24 hours. Thirty of the men were standing watch on a 6-hours-on - 12-hours-off rotation which effectively imposed an 18-hour cycle on their activities. The 6-on - 12-off watch schedule appeared to result in less sleep fragmentation than the traditional 4-on - 8-off schedule employed on other naval ships. Questions in the logs were used to assess subjective sleep quality and sleepiness. Sleep quality on patrol was not as good as in a post-patrol period, but the difference between on- and off-patrol sleep quality was small. (Author)

**A82-14275 Diurnal variation in vigilance efficiency.** A. Craig, W. P. Colquhoun (Medical Research Council, Laboratory of Experimental Psychology, Brighton, Sussex, England), and R. T. Wilkinson (Medical Research Council, Psychophysiology Section, Cambridge, England). *Ergonomics,* vol. 24, Aug. 1981, p. 641-651. 24 refs.

Five sets of data are presented, obtained from studies that examined the influence of time of day on auditory vigilance performance during the normal waking day. Although both hits and false alarms exhibited a fairly consistent tendency to be lowest at the first test time in the morning, 1 or 2 hours after awakening from sleep, and to increase in parallel thereafter, the magnitude of change was modest and the time-of-day effect was statistically reliable in only a minority of the analyses. The slight changes that did occur seemed largely attributable to shifts in response criterion rather than to altered levels of signal detectability. In admonitory contrast with these findings, which have reassuring implications for vigilance efficiency during normal day-work, additional evidence is presented indicating that detectability levels may alter within the daylight span when the normal sleep-work-rest routine is disturbed. (Author)

**A82-14347 * Chronic exposure of a honey bee colony to 2.45 GHz continuous wave microwaves.** B. B. Westerdahl and N. E. Gary (California, University, Davis, CA). *Space Solar Power Review,* vol. 2, no. 3, 1981, p. 283-295. 8 refs. Research supported by the U.S. Department of Energy; Contract No. NAS2-9539.

A honey bee colony (Apis mellifera L.) was exposed 28 days to 2.45 GHz continuous wave microwaves at a power density (1 mW/sq cm) expected to be associated with rectennae in the solar power satellite power transmission system. Differences found between the control and microwave-treated colonies were not large, and were in the range of normal variation among similar colonies. Thus, there is an indication that microwave treatment had little, if any, effect on (1) flight and pollen foraging activity, (2) maintenance of internal colony temperature, (3) brood rearing activity, (4) food collection and storage, (5) colony weight, and (6) adult populations. Additional experiments are necessary before firm conclusions can be made. (Author)

**A82-14348 * Survival, development, and teratology of honey bee brood /Apis mellifera L./ following exposure to 2.45 GHz continuous wave radiation.** B. B. Westerdahl and N. E. Gary (California, University, Davis, CA). *Space Solar Power Review,* vol. 2, no. 3, 1981, p. 297-303. 8 refs. Research supported by the U.S. Department of Energy; Contract No. NAS2-9539.

**A82-14674 † Gamma facilities for radiobiological investigations /Design and experimental results/ (Gamma-ustanovki dlia radiobiologicheskikh issledovanii /Konstruktsii i rezul'taty eksperimental'nykh issledovanii/).** A. N. Gladilkin, I. V. Ignatov, R. A. Kuzin, V. I. Popov, V. V. Iurgov, and A. V. Shafirkin. Moscow, Izdatel'stvo Energoizdat, 1981. 60 p. 37 refs. In Russian.

Facilities for the study of the biological effects of gamma radiation under natural and simulated conditions are discussed, and results of experiments using certain of these devices are presented. Particular attention is given to the Liustra and Kobal't apparatuses used to model chronic galactic cosmic ray and acute solar cosmic ray exposures respectively, under space flight conditions in large laboratory animals, the Enot 1 and 2 facilities for the modeling of chronic and acute exposures in small laboratory animals under a wide range of dose rates, the Svet apparatus for the determination of the relative biological effectiveness of heavy charged particles, the Start facility used for the final development of space exposure experiments, and the Integral and OU-3 facilities used in radiobiological experiments under high-altitude and space flight conditions. A.L.W.

**A82-14677 SADT/SAINT simulation technique.** R. F. Bachert (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH), K. H. Evers, and P. R. Santucci (SofTech, Inc., Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 4-9. 7 refs.

Structural Analysis and Design Technique (SADT) is a structured technique for doing functional analysis and system design. System Analysis of Integrated Networks of Tasks (SAINT) is a computer simulation tool currently used by the USAF for modeling and analyzing large-scale man-machine systems. By linking SADT with SAINT, a system can be defined in general terms, decomposed to the necessary level of detail, translated into SAINT nomenclature, and entered into the SAINT program. SADT/SAINT provides the capability of translating from one graphic technique to another, as well as from a static model to a dynamic one. A brief explanation is given as to how a SADT activity diagram communicates a system description, how a SAINT model is represented, and how to transition from SADT to SAINT. J.F.

**A82-14703 # Validating manned system design and engineering change proposals.** G. P. Chubb, B. D. Purvis, and E. D. Sharp (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 191-196. 10 refs.

An empirical approach has been developed for the validation of human factors engineering design aspects of major B-52 modernization programs which may be applicable to other systems. The Strategic Avionics Crewstation Design Evaluation Facility (SACDEF) attempts to duplicate the crew workload imposed by the anticipated mission using relatively inexperienced operators to help identify system or design weaknesses. SACDEF employs real-time minicomputer simulations of system mechanization at each crew station. The SACDEF simulation approach is considered applicable in all stages of the life cycle of the system from concept formulation through full-scale development and production to modification/modernization, with a shift in emphasis from the support of acquisition activities to the support of logistics activities as the system progresses. Benefits of validation by the system user include a cross check on contractor design with the identification of problems by user, rather than contractor, personnel, and the prevention of unforeseen operational deficiencies difficult to correct. S.C.S.

**A82-14746 Digital spirometer for automatic pulmonary function.** D. E. Turner, J. S. Petrofsky, and R. M. Glaser (Wright State University; U.S. Veterans Administration Medical Center, Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 584-588. Research supported by the U.S. Veterans Administration and U.S. Air Force.

The purpose of this project was to develop a digital spirometer for automatic pulmonary function. Advantages of this device are that it is: small in size, light weight, portable (battery powered), immune to exercise movement and high G forces, and relatively inexpensive. It can compute and display inspiratory or expiratory pulmonary ventilation over 30 or 60 sec time intervals, respiratory rate and gas temperature over the normal physiological ranges. The system incorporates a commercial turbine flow transducer (KLE 511) and readily available electronic components. A schematic diagram of the electronics package is provided, as is a functional description of the circuit. Accuracy of this instrument was found to be excellent with both constant and pulsatile flows, at various flow rates. (Author)

**A82-14903 Cardiovascular responses to mixed static and dynamic exercise.** P. V. Fiore, J. S. Petrofsky (Wright State University, Dayton, OH), and R. M. Glaser (Wright State University; U.S. Veterans Administration Medical Center, Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics

Engineers, Inc., 1981, p. 1066-1071. 11 refs. Research supported by the U.S. Veterans Administration and U.S. Air Force.

The purpose of this study was to evaluate the effect of dynamic exercise on the cardiovascular responses during subsequent fatiguing isometric exercise. College-age males performed a series of three fatiguing isometric contractions at a tension of 40% of their maximal voluntary strength of their quadriceps muscles. The period between the contractions was either one, three, or 20 minutes. During this period, subjects either rested (control), pedalled a bicycle ergometer at a load of 0 kp, or at a load which demanded 50% of their maximal oxygen uptake (VO2 max). Only one combination of experiments was performed by a subject in a 24-hour period. Cardiovascular responses during subsequent static exercise returned to control values following intervals of rest. Pedalling at a load of 0 kp had little effect on altering the cardiovascular response compared to resting control intervals. In contrast dynamic exercise at 50% VO2 max altered the cardiovascular response markedly to subsequent isometric exercise. (Author)

A82-14804 **Steady and unsteady pressure-flow relations in bronchial tree models.** D. B. Reynolds, R. M. Glaser (Wright State University, Dayton, OH), and J.-S. Lee (Virginia, University, Medical Center, Charlottesville, VA). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 1072-1078. 20 refs. Research supported by the U.S. Veterans Administration; Grant No. NIH-HL-16812.

Few physical model studies of expiratory flow-pressure relations in the bronchial tree have been reported. The present study investigates pressure drop across a model of a canine tracheobronchial tree during steady expiration and unsteady respiration simulating inspiration and expiration. Water was used to amplify pressure drops and flows produced tracheal Reynolds numbers in a physiologically important range between 1000 and 10,000. The results could be described by two distinct power laws, presumably corresponding to laminar and turbulent flow regimes. However, a single equation described the data over the entire range of Reynolds numbers. Unsteady flow results indicated that when the Strouhal number is less than 0.001, unsteady flow behaves nearly steady. (Author)

A82-14805 # **A study of performance effects under G stress.** D. W. Repperger, D. B. Rogers, and J. W. Frazier (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 1079-1085.

Several variables must be considered in order to measure human tracking performance changes under G stress. First it is necessary to establish a uniform set of tracking tasks which are sensitive to the stress-nonstress condition. In this paper, five tasks were chosen to delineate different levels of tracking difficulty. The five tasks chosen were required to satisfy the criteria of being zero mean, constant variance, and sum of sines. It was also desired to observe, from an experimental study, human performance changes between each task number in the static or stress mode. In comparing the static to the stress mode it was hoped to observe a performance change across the experimental conditions stress-nonstress for each task number. This paper reports the results of this experiment and how these performance tasks can be used to study stress effects on pilots exposed to G acceleration. (Author)

A82-14806 **Comparison of impedance ventricular function indices with systolic time intervals.** M. A. Bassett Frey, B. M. Doerr, B. L. Mann, and D. S. Miles (Wright State University, Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 1086-1093. 31 refs. Research supported by the American Heart Association.

The purposes of this study were to noninvasively assess differences in central hemodynamics associated with supine, seated, and standing postures and to examine the relationship between ventricular function (VF) indices obtained by the established method of systolic time interval (STI) analysis and by impedance cardiography (IC). The electrocardiogram, phonocardiogram, and impedance cardiogram were recorded from seven women in three postures. Heart rate, stroke volume (SV) and cardiac output (CO) monitored by IC were significantly changed with posture. All STI VF variables responded to posture; however, IC VF variables were not significantly altered by posture. IC and STI VF variables were strongly correlated in all three postures. IC should provide a safe, atraumatic, and reliable method of monitoring VF, SV, and CO for aerospace physiology. (Author)

A82-14837 **Automated item recognition as a secondary task for objective assessment of aircrew workload in flight simulators.** R. J. Spicuzza and M. S. Crabtree (Systems Research Laboratories, Inc., Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 1338-1341. 10 refs. Navy-supported research.

A low-cost, microprocessor-controlled device containing an item recognition task has been designed for assessing workload in laboratories, simulators and aboard airborne flight testing programs. The hardware includes a real-time controller and data collection device, software, and a ground-based data analysis package. A chassis has been constructed such that it is small enough to be portable, and also fits into the nose of the NT-33A aircraft. In order to create a cassette tape containing the operating program and stimulus parameters, a microcomputer containing two floppy disks drives mainframe, CRT terminal, printer, digital tape recorder, and the disk operating system. S.C.S.

A82-14839 **Evaluation of imbedded radio communications activities as secondary tasks for objective assessment of aircrew workload in simulators, trainers, and actual systems.** M. S. Crabtree and R. J. Spicuzza (Systems Research Laboratories, Inc., Dayton, OH). In: NAECON 1981; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 19-21, 1981. Volume 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. 1349-1352.

The use of radio communications activity as a noninterfacing, imbedded secondary task for the objective assessment of varying operator workload has been examined. The basic classes of tasks studied are waypoint passage, jammed communications, threat report, and identification. The simulator system was designed around a PET MDL 2000 computer interfaced to radio switches by a 16-channel multiplexer and A/D converter. Verbal responses and switch-changing data recorded on tape show that the simulation facility provides an excellent device for dual-task performance research concerned with evaluating the sensitivity of radio tasks to changes in operator workload. S.C.S.

A82-14957 **The physiological response of anthropometrically selected female military personnel to the test parachuting environment.** J. H. Gilbert, H. T. Pheeny, J. E. Doerr, and G. F. LaMora (U.S. Naval Weapons Center, Parachute Engineering Div., China Lake, CA). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 68-75. 12 refs.

Female Naval test parachutists were biomedically monitored to define the stresses encountered during aircraft exit and parachute descent. The subjects were instrumented for pulse rate by an ECG, for respiratory rate, eye movement, and g loads during opening shock; data was telemetered by an FM/FM data acquisition system to a computerized ground station. Nine jumps have been recorded for two subjects, allowing the appearance of any gradients from novice to experienced parachutist physiological responses to become apparent. Results for the females were equivalent to data from tests with males; heart rate, respiratory rate, and lateral eye movements all show peaks in a bimodal response just before parachute deployment and just after landing. Female heart rates did not, however, display adaptive decreases with experience, although the sample is judged to be of insufficient size to be conclusive. M.S.K.

**A82-14959** **An investigation of ripcord pull force capability of male and female skydivers for ripcords located on the left main lift web at chest level.** M. Johnston and J. Sherman (Jump Shack, Inc., Farmington Hills, MI). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 80-83.

A study of the actual ripcord pulling capability of trained skydivers, both male and female and also of untrained individuals has been conducted to either confirm or deny two previously conducted studies. One previous study concerned only males, the other concerned only females. The results of this study indicate that there is no need to revise down the FAA TSO requirements for ripcord pull force limits for back mounted parachutes. (Author)

**A82-14962** **In-flight physiological monitoring of tactical jet aircrewmen.** D. W. Call, D. G. Robertson, D. M. Kelly (U.S. Navy, Pacific Missile Test Center, Point Mugu, CA), and J. T. Merrifield (USAF, School of Aerospace Medicine, Brooks AFB, TX). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 97-100. 6 refs.

The U.S. Navy and the U.S. Air Force have been involved in developing and employing techniques to obtain in-flight aeromedical data for several years. These joint efforts have been both to acquire physiological data as a research tool in the test and evaluation of aircrew equipment and to carefully define the pilot's response to the multi-stress environment of tactical jet flying. This paper traces the chronology of this development and describes in detail the current in-flight physiological data acquisition system (IFPDAS) used by both services. The IFPDAS recorder is completely self-contained and can be worn by any aircrewmember. The system can monitor, condition and record up to 12 analog and 32 digital channels of physiologic and environmental data on a four track magnetic tape cassette. Data analysis and display are provided by a ground based data reproducer, portable field data processor and teleprinter. (Author)

**A82-14964** **Factors affecting seat-man dynamics during emergency egress.** G. D. Frisch (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 110-115. 8 refs.

An analysis comprising mathematical simulation and dummy and human tests to determine the adequacy of a crew station configuration is presented. Crew stations were ranked according to the probability of physical interference between limbs and crew station structure during ejection. A Euclidean aircraft coordinate system was devised to identify anthropometric anatomical reference points in relation to position in the cockpit and along the ejection vector. Acceleration at the knee was found to determine lower leg and foot responses, while dummy ejections revealed foot-instrument panel contact at 175 msec into ejection due to inward rolling of the thigh. Knee location and thigh height were determined to be critical parameters affecting the chances of instrument panel collisions during ejection, along with full rudder pedal heel cups and height of the feet above the floor pan. M.S.K.

**A82-14971** **Holographic laser eye protection.** G. Twine Chisum (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 180-182.

Development of a method of protecting the eyes of military personnel has been pursued for a number of years. The devices developed have marginal acceptability, particularly for aircrew personnel. Efforts under way to develop a holographic diffraction grating protection device indicate that such a device is feasible and that the requirements of high transmittance, multiple wavelength rejection and aircrew helmet visor configuration can be met. A program has been established to develop an operational device. The program anticipates a device which can be evaluated operationally within two years. (Author)

**A82-14973** **U.S. Navy molecular sieve on-board oxygen generation system - An update.** M. J. Lamb (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA). In: Survival and Flight Equipment Association, Annual Symposium, 18th, San Diego, CA, October 12-16, 1980, Proceedings. Canoga Park, CA, Survival and Flight Equipment Association, 1981, p. 192-195.

An on-board oxygen generator (OBOG) system for operation on Navy tactical aircraft is described. The molecular sieve OBOG has three major components: oxygen concentrator, breathing regulator, and performance monitor. The system filters all gases from the engine bleed air except for argon and oxygen, which are concentrated into a 5% and 95% mix, respectively. The concentrator measures the mass flow rate and the regulator provides the oxygen concentrate on demand. A polarographic partial pressure sensor, and electronics module, and a compensating aneroid maintain the constant absolute pressure at a level equivalent to 28,000 ft in the sensor cavity. Successful tests are enumerated and future operational evaluations are outlined. The OBOG system eliminates the need for LOX generation equipment on board naval ships, and allows placement of V/STOL aircraft on nonaviation sea craft. M.S.K.

**A82-15280** **Some contributions of touch, pressure and kinesthesis to human spatial orientation and oculomotor control.** J. R. Lackner (Brandeis University, Waltham, MA). *Acta Astronautica,* vol. 8, Aug. 1981, p. 825-830. 21 refs.

Human spatial orientation and oculomotor control are under multimodal influence. It is not possible in the normal animal to stimulate differentially the vestibular receptors without activating other receptor systems whose activity may have a profound influence on postural control and experienced orientation. Many patterns of behavior and response that have been attributed solely to vestibular function are actually dependent wholly or in part on touch, kinesthetic, and proprioceptive stimulation. (Author)

**A82-15351** † **The self-stimulation response in cats in a nitrogen-oxygen medium under elevated pressure (Reaktsiia samostimuliatsii u koshek v azotno-kislorodnoi srede pod povyshennym davleniem).** G. K. Akhmetova, E. L. Poliakov, and G. V. Troshikhin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Oct. 1981, p. 1476-1479. 13 refs. In Russian.

**A82-15352** † **Nucleic acid and protein concentrations in rat raphe nuclei neurons and gliocytes during complete sleep deprivation in the cylindrical tretbahn (Soderzhanie nukleinovykh kislot i belkov v neironakh i gliotsitakh iader shva krysy pri polnom lishenii sna v tsilindricheskom tretbane).** U. M. Malikov and A. N. Panov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Oct. 1981, p. 1506-1510. 20 refs. In Russian.

**A82-15353** † **DNA and RNA synthesis in the isolated nuclei of rat skeletal muscle fibers during hypokinesia (Sintez DNK i RNK v izolirovannykh iadrakh volokon skeletnykh myshts krys pri gipokinezii).** I. V. Fedorov, G. S. Komolova, and A. V. Chernyi (Iaroslavskii Gosudarstvennyi Meditsinskii Institut, Yaroslavl; Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Oct. 1981, p. 1521-1524. 20 refs. In Russian.

**A82-15358** * **A single-channel model does not predict visibility of asynchronous gratings.** A. B. Watson (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, CA). *Vision Research,* vol. 21, no. 12, 1981, p. 1799, 1800.

A single channel model is shown to lack the capability to predict the visibility of asynchronous compound gratings. A constant Beta was assumed, based on Monte-Carlo simulations, and used to show that an SE of 6.73 (Limb, 1981) lies outside of an acceptable confidence interval. Potential imbalances between two eyes cannot be as large as 1.5 dB, which can only affect one eye, or one region of a retina. An average unbalance of 0.53 dB (SE = 0.12) employed in experiments to measure thresholds was compensated for by estimated threshold reductions. Trial-to-trial variability was included in the single channel model, as were considerations of retinal inhomogeneity. Temporal sensitivity for 2 and 4 c/deg grating patches were measured, and the amplitude response of a single channel at the two spatial frequencies were obtained. Threshold reductions with a Beta of 3.1 are then determined to not be significant enough to warrant adoption of the single channel model predictions. M.S.K.

**A82-15391** **Automatic planning of manipulator transfer movements.** T. Lozano-Perez (MIT, Cambridge, MA). *IEEE Transactions on Systems, Man, and Cybernetics,* vol. SMC-11, Oct. 1981, p. 681-698. 51 refs. Contract No. N00014-77-C-0389.

The class of problems that involve finding where to place or how to move a solid object in the presence of obstacles is discussed. The solution to this class of problems is essential to the automatic planning of manipulator transfer movements, i.e., the motions to grasp a part and place it at some destination. For example, planning transfer movements requires the ability to plan paths for the manipulator that avoid collisions with objects in the workspace and the ability to choose safe grasp points on objects. The approach to these problems described here is based on a method of computing an explicit representation of the manipulator configurations that would bring about a collision. (Author)

**A82-15475** **The sensitivity of the retinal nerve fibre layer to elevated intraocular pressure and graded hypoxia in the cat.** F. Grehn (University Eye Clinic, Freiburg im Breisgau, West Germany). (Bundesministerium für Forschung und Technologie, Municipality of Vienna, Vienna Academy of Medicine for Postgraduate Studies, and Vienna Tourist Board, Proceedings of the Symposium on Information Processing in the Retina, Vienna, Austria, July 10-12, 1980.) *Vision Research,* vol. 21, no. 11, 1981, p. 1697-1701. 19 refs. Deutsche Forschungsgemeinschaft Contracts No. GR-161; No. GR-538; No. SFB-70.

The effects of a conduction blockade of the nerve fiber layer in the eye of a cat during transient intraocular pressure (IOP) increases and stages of hypoxia were studied. The experiment comprised 14 cats as subjects, anesthetized and subjected to varying levels of IOP induced by a manometer or hydrostatically by a Ringer solution reservoir connected to a cannula in the anterior eye chamber; hypoxia was induced by altering artificial respiration or by providing hypoxic N2/O2 mixtures. The optic tract ipsilateral to the eye was stimulated electrically to elicit antidromic field potentials of the nerve fiber layer. The impulses in unmyelinated axons during acute IOP elevation were found to conduct longer than synaptic signals transmitted in the retina. Transfer of the results to moderate IOP levels caused by glaucoma are not considered to be justified at present. M.S.K.

**A82-15515** # **Experimental studies on the survival capacity in the sealed environment. III.** H. Fujikvara (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, Mar. 1981, p. 1-12. 12 refs. In Japanese, with abstract in English.

The effects of hypoxia, cold stress, and lethal oxygen and CO2 concentrations in sealed environments on survival time are evaluated for 57 Sprague-Dawley strain male rats at 4, 7, 9, and 12 weeks of age. At 12 weeks the mean survival time is 4.7 + or - 0.7 hours in a 10 liter chamber ranging from about 2-6 C, and at 4 weeks of age the mean survival time is 10.8 + or - 1.7 hours in a 10 liter chamber ranging from about 2-8 C. The mean lethal oxygen concentration is 4.8 + or - 0.2% for all age groups, while the CO2 mean lethal concentration is 13.2 + or - 0.3% for all age groups. Results are also compared with theoretical values showing fair agreement. D.L.G.

**A82-15516** # **Development of a secondary task method for measuring operator workload. V - Measurement of pilot workload during take off and landing by C-1 jet carrier.** Y. Nagasawa, S. Aramaki, and N. Utsuki (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, Mar. 1981, p. 13-27. 20 refs. In Japanese, with abstract in English.

An in-flight study of pilot workload during takeoff and landing of a C-1 JASDF jet carrier was conducted. Normal take-off and landing patterns were arbitrarily divided into ten flying segments, and a visual-auditory discriminative secondary task was added, which consisted of a lamp box with red and green lights mounted on the instrument panel. The subject was required to detect only those signals synchronized with red light and a 1200 Hz tone. No remarkable changes in flying performance were noted, although significant correlations were found between miss rate of secondary task and the task time stress index. Potential workload was derived by means of a time series analysis involving task flow and secondary task performance. D.L.G.

**A82-15517** # **Performance changes during exposure to +Gz stress.** Y. Nagasawa, M. Iwane, M. Ono, A. Onozawa, S. Ogata, and C. Sekiguchi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, Mar. 1981, p. 29-43. 23 refs. In Japanese, with abstract in English.

The relationship between performance and physiological responses was studied to develop an evaluating method of G tolerance in terms of changes in heart rate, vertical visual field, and tracking performance. Twelve subjects were exposed to 2, 3, 4, and 5 +Gz stress of 60 second durations in an AML human centrifuge, and the mean heart rate was found to elevate with increasing G level, especially above 3 G. Vertical visual field was constricted with increasing G levels, and mean tracking error appreciated with increasing G levels. Frequency characteristics of tracking performance were also analyzed, and a decrease in gain ratio with an increase in phasal difference of performance was observed during exposure to G stress. D.L.G.

**A82-15518** # **Aircraft noise and speech communication interference in JASDF air traffic control room.** O. Fujiwara and N. Utsuki (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, June 1981, p. 57-72. 9 refs. In Japanese, with abstract in English.

The aircraft-induced environmental noise in control rooms of eleven JASDF air traffic control towers was estimated by obtaining noise levels, frequency spectra, speech signal-to-noise ratios, speech interference levels (SIL), and attenuation abilities of the structures. Noise conditions of the ATC rooms were classified onto five grades ranging from excellent to bad, according to the peak noise level and SIL. No ATC rooms could be classified as excellent or good, three rooms were estimated as fair, and five were judged to be below poor standards. D.L.G.

**A82-15519** # **Thermal test of flying helmet for two different types of impact protection devices - Nylon sling and polystyrene liner.** K. Tagami, W. Ogawa, K. Shimizu, N. Kawabata, and F. Tomita (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, June 1981, p. 73-83. 11 refs. In Japanese, with abstract in English.

Two types of impact protection devices for flight helmets were tested in hot environments under varying thermal conditions: a polystyrene liner and a nylon sling. Differences of helmet shell, liner, and head skin temperatures were found to be significantly higher for the polystyrene liner helmet than for the nylon sling helmet, whereas the oral temperature of the former helmet did not rise significantly. E.J.

**A82-15520** # **A study of self-initiated elimination from the flight training. I - Reasons for self-initiated elimination.** M. Okaue and H. Aruga (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, June 1981, p. 85-96. 6 refs. In Japanese, with abstract in English.

Flight training students who had eliminated themselves from the training program in JASDF were studied to investigate factors contributing to elimination in terms of causes, training phases of student attrition, ratings in the flight aptitude test (APT), and aircraft accidents concerning students. Most students who quit due to fear of flight or loss of confidence were rated low on the APT flight test, and mean scores of items in the anxiety scale were significantly higher in those students who quit due to too much pressure, fear of flight, or personality traits not suitable for pilots. Accidents appeared to have little statistical significance. D.L.G.

**A82-15521 #** **Trouble shooting pattern of emergency through instruments by jet-pilots. II.** Z. Katoh, T. Shimizu, Y. Kakimoto, H. Iwamoto, and T. Nakabayashi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, June 1981, p. 97-112. 6 refs. In Japanese, with abstract in English.

A questionnaire survey was conducted among 119 JASDF jet pilots to obtain data on emergency experience and educational training on emergency aircraft. Results showed that 71% of all pilots had at one time or another experienced some sort of trouble, and most had their first indication of such trouble when abnormal acceleration or deceleration was sensed. This suggests that a high priority information source is body-sense oriented. No significant individual difference or aircraft difference was noted when obtaining sequences of necessary information for diagnosing four types of randomly selected problems. D.L.G.

**A82-15681** **An approach to algorithms for processing data from the visual sensor of an integrated robot (Otnosno edin podkhod za algoritmichno osiguriavane na videosenzor za integralen robot).** G. E. Kandilarov (B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika i Robotika, Sofia, Bulgaria) and K. B. Kr'stev (B'lgarska Akademiia na Naukite, Institut po Khidrologiia i Meteorologiia, Sofia, Bulgaria). *Problemi na Tekhnicheskata Kibernetika i Robotikata,* no. 12, 1981, p. 75-83. 6 refs. In Bulgarian.

The paper describes methods for the automated processing of visual information used for the control of third-generation robots. Particular attention is given to a method for measuring a metric parameter that plays an important role in scene analysis: namely the longest span of the contour of the image obtained from a TV sensor. The methodological error is investigated, and the possibility of taking this error into account when making measurements is considered. It is concluded that the results could be used successfully in the design of visual sensors for integrated robots and control systems which use structural analysis of visual information. B.J.

**A82-15697 *** **Digital image processing of bone - Problems and potentials.** E. R. Morey and T. J. Wronski (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Metabolic Bone Disease and Related Research,* vol. 2 S, 1980, p. 463-468. 6 refs.

The development of a digital image processing system for bone histomorphometry and fluorescent marker monitoring is discussed. The system in question is capable of making measurements of UV or light microscope features on a video screen with either video or computer-generated images, and comprises a microscope, low-light-level video camera, video digitizer and display terminal, color monitor, and PDP 11/34 computer. Capabilities demonstrated in the analysis of an undecalcified rat tibia include the measurement of perimeter and total bone area, and the generation of microscope images, false color images, digitized images and contoured images for further analysis. Software development will be based on an existing software library, specifically the mini-VICAR system developed at JPL. It is noted that the potentials of the system in terms of speed and reliability far exceed any problems associated with hardware and software development. A.L.W.

**A82-15698 *** **Neurotrophic factor - Characterization and partial purification.** H. Popiela and S. Ellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Developmental Biology,* vol. 83, 1981, p. 266-277. 29 refs.

Recent evidence suggests that neurotrophic activity is required for the normal proliferation and development of muscle cells. The present paper reports a study of the purification and characterization of a neurotrophic factor (NTF) from adult chicken ischiatic-peroneal nerves using two independent quantitative in vitro assay systems. The assays were performed by the measurement of the incorporation of tritiated thymidine or the sizes of single-cell clones by chick muscle cells grown in culture. The greatest amount of neutrotrophic activity is found to be extracted at a pH of 8; aqueous suspensions of the activity are stable to long-term storage at room temperature. The specific activity of the substance is doubled upon precipitation with ammonium sulfate or after gel filtration, and increase 4 to 5 fold after salt gradient elution from DEAE cellulose columns. The active fraction obtained after gel filtration and rechromatography on DEAE cellulose exhibits a 7 to 10-fold increase in specific activity. Electrophoresis of the most highly purified material yields a greatly concentrated band at around 80,000 daltons. Although NTF is purified almost 10-fold as indicated by the increase in specific activity, the maximum activity of the partially purified material is greatly reduced, possibly due to a requirement for a cofactor for the expression of maximum activity. A.L.W.

**A82-15700 *** **From inanimate matter to living systems.** S. W. Fox (Miami, University, Coral Gables, FL). *American Biology Teacher,* vol. 43, Mar. 1981, p. 127-140. 65 refs. Grant No. NGR-10-007-008.

Current understandings of the origin and evolution of life on earth from inaminate matter are reviewed. Approaches to the study of early life and its origin are considered, and it is noted that whereas the inference of origins from knowledge at hand is the approach favored by most theoreticians, only the laboratory simulation of the assembly of precellular polymers to protocells under geologically relevant conditions is capable of indicating the way in which life began. Progress in simulating the step-by-step emergence of a protocell composed of ordered macromolecules and having numerous protobiological activities through stages characterized by primordial matter, amino acids, proteinoids, protocells, light-active protocells and nucleic-acid instructed cells is discussed, with particular emphasis on experiments with proteinoid microspheres formed from self-ordered copolyamino acids. The subsequent development of ordered, protometabolic, infrastructured protoreproductive protocells is examined noting the importance of the formation of lysine-rich proteinoids with catalytic activities. Attention is also given to questions of the point of the actual emergence of life and scientific and creationist objections to the theory developed. A.L.W.

**A82-15701 †** **The influence of scopolamine on the formation and fixation of temporary connections in rats with altered brain serotonin levels (Vliianie skopolamina na formirovanie i fiksatsiiu vremennyk sviazei u krys s izmenennym urovnem serotonina v golovnom mozge).** V. M. Getsova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, July-Aug. 1981, p. 763-770. 26 refs. In Russian.

**A82-15702 †** **Mathematical model of the spatial distribution and accumulation of assimilates in plants (Matematicheskaia model' prostranstvannogo raspredeleniia i nakopleniia assimiliatov v rasteniі).** K. M. Sytnik, T. S. Kurchenko, and O. A. Nemchenko (Akademiia Nauk Ukrainskoi SSR, Institut Botaniki and Institut Gidrobiologii, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 250, no. 6, 1980, p. 1466-1469. 8 refs. In Russian.

A mathematical model is proposed for the spatial distribution of photosynthesis products (assimilates) in the above-ground and underground parts of plants. The model considers the processes of growth, absorption and the accumulation of substances by cells as continuous in time, and contains explicit equations for the dynamics of the factors specifying the condition of the underground and above-ground parts during the growth of a root vegetable. Possible applications of the model include the description of the relation between the productive and reproductive parts of plants during the growth process, the distribution of assimilates in storage organs, and the formation of the spatial forms of fruits or root vegetables, and the calculation of the influence of ecological factors on the production process. A.L.W.

**A82-15703 †** **EEG-correlates of training in the voluntary control of heart rate in man (E.e.g.-korreliaty obucheniia proizvol'nomu kontroliu chastoty serdtsebienii u cheloveka).** A. N. Borgest, M. I. Talan, and V. N. Chernigovskii (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 250, no. 6, 1980, p. 1487-1490. 12 refs. In Russian.

Changes in EEG processes occurring during the training of healthy human subjects in the voluntary control of heart rate are investigated. Four subjects were monitored by means of electrocardiography and electroencephalography before and after a period of conditional training based on a punishment avoidance model to change, increase and decrease heart rate at will. Amplitudes of the integrated delta- and theta-wave spectra are found to increase significantly during training in the increasing or changing of heart rate, even if the actual rate change was not accomplished, while the alpha waves increased in integrated amplitude during training in acceleration and decreased during training to slow the heart beat. Spontaneous changes in heart rate are observed to be directly related to changes in alpha-wave amplitude, while the slow-wave patterns do not change at all during spontaneous increases in heart rate and decline during spontaneous decreases. It is proposed that the theta-rhythm variations during heart rate control training reflect a complex relationship between emotional factors of the situation and the adjustment of autonomic functions. A.L.W.

**A82-15704** † **A discrete model of the circadian kinetics of human bone marrow (Diskretnaia model' tsirkadnoi kinetiki kostnogo mozga cheloveka).** M. A. Blank (Nauchno-Issledovatel'skii Institut Onkologii; Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 252, no. 1, 1980, p. 224, 225. 8 refs. In Russian.

A model is developed expressing the diurnal variation in bone marrow cell division rates. The model is based on data obtained from taps of healthy bone marrow of 77 patients with localized malignant tumors taken at various times of the day, which indicates the greatest number of cell divisions to take place at 3 a.m., and the fewest to take place from 3 to 6 p.m. The rate of cell divisions is expressed as a sine curve with a peak at 3 a.m. corresponding to the M (mitotic) phase of the cell cycle, and the G1, S and G2 phases distributed in the day according to the period of time at which the greatest number of cells are expected to be found in the corresponding state. The model may be used to determine the time of day most suitable for the administration of various phase-specific myelotoxic agents. A.L.W.

**A82-15705** † **Dynamics of plant physiological activity during a light interruption of the dark period of the day (Dinamika aktivnosti fiziologicheskikh protsessov u rastenii v techenie svetovogo preryvaniia temnovogo perioda sutok).** V. G. Karmanov, G. A. Odumanova-Dunaeva, and E. V. Solov'ev (Vsesoiuznaia Akademiia Sel'skokhoziaistvennykh Nauk, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 252, no. 2, 1980, p. 509-512. 15 refs. In Russian.

**A82-15706** † **Harmful effects of temperature under conditions of elevated pressure in a helium-oxygen environment (Porazhaiushchee deistvie temperaturnogo faktora v usloviiakh povyshennogo davleniia geliokislorodnoi sredy).** I. A. Aleksandrov, V. B. Kostkin, B. S. Dashevskii, B. I. Sokolovskii, and L. A. Sirotina (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 256, no. 1, 1981, p. 225-227. 6 refs. In Russian.

The tolerances of warm-blooded animals to various temperature regimes in a hyperbaric helium-oxygen medium similar to that encountered in deep-sea diving are investigated. Experiments were performed on 85 guinea pigs maintained in a helium-oxygen atmosphere at a pressure of 3,600,000 Pa for 24 hours at temperatures from 22 to 40 C. The animals are observed to have perished at the end of 24 hours when kept at temperatures less than 30 C or greater than 36 C, with deaths occurring sooner the further the environmental temperature was from this zone. Analysis reveals the primary cause of death in these instances to be the disruption of temperature homeostasis. Results thus reveal that normal thermoregulatory mechanisms lose their effectiveness under hyperbaric conditions in an oxygen-helium medium, so that a narrow temperature range must be maintained to prevent either a harmful lowering or elevation in body temperature. A.L.W.

**A82-15707** † **Structural changes in motor neurons during hind limb immobilization (Strukturnye sdvigi v motoneironakh pri immobilizatsii zadnikh konechnostei).** T. E. Korneeva and O. S. Merkulova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 258, no. 1, 1981, p. 247-249. 12 refs. In Russian.

The nature and direction of structural changes in the spinal chord motor neurons of animals with their hind limbs immobilized for periods of from 1 to 5 weeks are investigated. Experiments were performed on frogs kept in a refrigerator and accustomed to a sedentary way of life so as to minimize experimental stresses, and consisted of the determination of perikaryon, nuclear and glycogen areas in motor neurons extracted from the lumbar enlargement of the spinal cord after 1, 2, 4 and 5 weeks of motionlessness. The reduction in the flow of afferent nerve impulses from the peripheral organs is observed to induce complex changes in nerve cell structure, including an initial increase, followed by a decrease, in cytoplasm area, and an increase in nuclear size. It is concluded that a limitation in motor activity leads to an impairment in spinal center functioning expressed as a decline in the excitability and structural rearrangements of nerve cells. A.L.W.

**A82-15708** † **The classification of hypoxic conditions (O klassifikatsii gipoksicheskikh sostoianii).** A. Z. Kolchinskaia (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 3-10. 20 refs. In Russian.

The various schemes developed for the classification of hypoxic conditions are examined. Following a brief review of the origin of the term and its recognition as the cause of various conditions, the system adopted at the conference in Kiev in 1949 is presented which distinguishes between hypoxic hypoxia, arising as a result of a decrease in oxygen partial pressure in the inspired air, difficulties in oxygen permeability into the blood, and disturbances in external respiration; hemic hypoxia due to a decrease in the oxygen binding capacity of hemoglobin; circulatory oxygen deprivation caused by a decrease in oxygen transport; and tissue hypoxia, in which tissues are unable to utilize oxygen supplied at normal levels, and which is argued to be a legitimate case of hypoxia. Difficulties in using the 1949 system are pointed out, and a new classification system is proposed which recognizes eight basic types of hypoxia: hypoxic, hyperoxic, hyperbaric, respiratory, circulatory, hemic, tissue and stress hypoxia, and which distinguishes between five stages in its development: latent, compensated, expressed with advancing decompensation, uncompensated and terminal. A.L.W.

**A82-15709** † **The oxygen regime of the human organism under conditions of extreme hypobaric hypoxia (Kislorodnyi rezhim organizma cheloveka v usloviiakh krainikh stepenei gipobaricheskoi gipoksii).** E. A. Kovalenko, A. Iu. Katkov, V. N. Sementsov, M. P. Bobrovnitskii, and R. N. Chabdarova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 26-31. 15 refs. In Russian.

The dynamics of alveolar, capillary and skin oxygen tension in humans under hypobaric hypoxia at simulated altitudes between 8000 and 10,000 m are investigated. Measurements were made during stepwise and continuous ascents to the simulated altitude tolerance level of up to 10,000 m before and after exposure to either impulsive pressure chamber training or altitude adaptation at 4200 m. It is found that upon ascent to 8000 m, the oxygen tension gradients between alveolar air and capillary blood as well as between capillary blood and the skin decrease. Altitude training is observed to lead to an increase in the maximum altitude tolerated as signaled by the performance of a simple mental task, accompanied by an increase in oxygen tension in the capillary blood, however not in the skin. A.L.W.

**A82-15710** † **Influence of 15-day alimentary starvation on human tolerance to the breathing of pure nitrogen (Vliianie 15-dnevnogo alimentarnogo golodaniia na perenosimost' chelovekom dykhaniia chistym azotom).** A. Iu. Katkov, N. K. Loginova, R. N. Chabdarova, Iu. B. Zolotareva, and T. A. Katargina (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem; Tsentral'nyi Nauchno-Issledovatel'skii Institut Stomatologii, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 66-68. 8 refs. In Russian.

Results are presented of an investigation of the effect of alimentary starvation on human tolerance to hypoxia induced by the breathing of pure nitrogen. Subject tolerance times to breathing pure nitrogen were assessed according to performance at a simple writing task, and correlated with continuous simultaneous measurements of respiratory minute volume, respiration and heart rates, electroencephalograms, rheoencephalograms, skin oxygen tension, general gas exchange and degree of deoxygenation. Following the 15-day period of complete fasting, tolerance times to the breathing of pure nitrogen are observed to increase by a factor of approximately 2. Data indicate that the antihypoxic effect of starvation is due to decreased oxygen demand and a decrease in oxygen concentration in the expired air, and is accompanied by changes in the functional states of cerebral vessels and peripheral microvessels. A.L.W.

**A82-15711 † Some characteristics of the aerial evacuation of the sick and otorhinolaryngologically injured (Nekotorye osobennosti evakuatsii vozdushnym transportom LORranenykh i bol'nykh).** F. N. Tetsrin and O. A. Nakapkin. *Voenno-Meditsinskii Zhurnal,* July 1981, p. 20, 21. 6 refs. In Russian.

Problems encountered and possible solutions to them in the aerial evacuation of the sick and persons with otorhinolaryngeal injuries are discussed. The most common problem is motion sickness, which is observed in 3% of healthy passengers on jet airplanes and 10% on conventional aircraft and which may aggravate existing vestibular lesions. For this reason, those patients susceptible to motion sickness are evacuated in a lying position and asked to fix their vision at a determined point, and certain antimotion sickness drugs may be administered prior to take-off, including atropine, scopolamine, pyridoxine, dimedrol and aeron. Significant variations in barometric pressure may also cause barootitis and barosinusitis in evacuated patients, which may be prevented by the deceleration or cessation of descents, swallowing maneuvers, loud conversation, lower jaw movements or ear inflation. Counterindications to aerial evacuation remain, however, in cases of injury or illness accompanied by breathing difficulty, unstopped heavy nosebleed, and abundant liquorrhea with combined otorhinolaryngeal organ and skull damage. A.L.W.

**A82-15712 † Management by means of muscular activity under unloaded conditions (Upravlenie aktivnost'iu myshts v 'beznagruzochnykh' usloviiakh).** A. V. Kovalik (Penzenskii Politekhnicheskii Institut, Penza, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Aug. 1981, p. 44, 45. In Russian.

The potential of selective muscular activity in the absence of any external burden for the prevention of hypodynamia is assessed. In a first series of experiments, the possibility of voluntarily effecting maximum exercise of various muscles was confirmed by measurements of muscle force and bioelectrical activity, although in most cases the magnitude of the exercise was less in the unloaded state than when overcoming some external burden, and various muscle groups showed more controllability than others. Measurements of the durations possible for alternating muscle exercise in the unloaded state have shown them to range up to 3 hours. The possibility of effecting muscular exercise under unloaded conditions thus allows the development of a training program aimed at improving muscular sense and elevating muscular activity at any time and under any conditions, and permits management by muscular function, guided only by muscular sense. A.L.W.

**A82-15713 † The nature of induced EEG activity in the alpha-rhythm range (O prirode vyzvannoi aktivnosti EEG v diapazone al'fa-ritma).** F. Ia. Zolotarev (Leningradskii Nauchno-Issledovatel'skii Institut Ekspertizy Trudosposobnosti i Organizatsii Truda Invalidov, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 586-592. 10 refs. In Russian.

The characteristic of alpha-wave activity induced by periodic photostimulus are investigated. Background and induced EEG activity was recorded in subjects lying in a darkened room with their eyes closed 15 cm away from a photostimulator emitting pulses at repetition frequencies from 8 to 14/sec. At stimulation frequencies of 8.0 and 9.5 pulses/sec, the descending front of the induced alpha wave is found to be longer than the ascending front. As the stimulus frequency increases, the duration of the descending front is observed to decrease while the ascending front maintains the same duration, resulting in the descending front becoming shorter than the ascending front. Further increases are observed to lead to a shortening of the ascending front so that the two fronts become equalized. Results, when regarded within the context of the dipole theory of neurons, suggest that both induced and background alpha waves represent an inhibitory post-synaptic potential in cortical neuron membranes. A.L.W.

**A82-15714 † Mechanisms of temporal discrimination in the visual analyzer (O mekhanizmakh vremennoi diskriminatsii signalov v zritel'nom analizatore).** V. I. Shostak and E. B. Stepanian (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 612-615. 17 refs. In Russian.

The functional labilities of various segments of the visual analyzer are measured in an investigation of the mechanisms determining the critical flicker fusion frequency, which has been established to be significantly lower than the functional lability of other nervous mechanisms. Ocular electrical sensitivity and the critical frequency for the disappearance of a flickering electrical phosphene were measured in subjects viewing achromatic and colored light signals at various levels of illumination. The electrical sensitivity threshold is found to depend on background illumination level, decreasing during the transition from darkness to the photopeak level. Electrical sensitivity is also observed to decrease from white to green to blue to red light. Critical flicker fusion frequencies determined under the same conditions never exceeded 43 Hz, while frequencies for electrically generated phosphene fusion ranged from 59 to 64 Hz. Results demonstrate that the functional lability of the visual analyzer depends upon the level of adaptation, and suggest that the temporal discrimination capacity of the visual analyzer is greater than the afferent system as a whole due to the relatively large time constant of the receptor photochemical processes. A.L.W.

**A82-15715 † Potential for the use of biorhythm structures for the prognosis of the course of a disease (Vozmozhnosti ispol'zovaniia struktury bioritmov v tseliakh prognoza techeniia zabolevaniia).** N. I. Moiseeva, L. I. Nikitina, A. V. Morozov, V. V. Denisova, E. S. Vintergel'ter, and A. M. Litvin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 752-754. In Russian.

The possibility of using the dynamic characteristics of circadian rhythms in the diagnosis of the state and the prognosis of the course of disease is investigated. Measurements of arterial pressure, body temperature, muscular strength, respiratory and heart rates and time sense were made five times daily in the periods before and after, and occasionally during, treatment of 50 patients with cerebral vascular circulation disorders of various causes and 33 patients with local cerebral lesions as a result of acute craniocerebral trauma. In both groups of patients, significant differences are found between the temporal structures of the diurnal variations in physiological parameters even before the start of treatment in patients for whom the outcome of treatment was favorable and those for whom the outcome was not favorable. A marked separation of extremum values, relative constancy of these values and a rather large spread of physiological parameters over the course of the day are found to be characteristics of the curves of those patients with a favorable course of illness, while those with unfavorable outcomes exhibit curve flattening and irregularities in maxima and minima. The structure of biological rhythms can thus be used as an indicator allowing the prognosis of the course of systematic brain diseases and local lesions. A.L.W.

**A82-15716 † Removal by negative air ions of changes in mitochondrial respiration under stress (Sniatie otritsatel'nymi aeroionami izmenenii dykhaniia mitokhondrii pri stresse).** M. N. Kondrashova, E. V. Grigorenko, I. B. Guzar, and E. B. Okon (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 687-691. 21 refs. In Russian.

The possible effects of air ions on mitochondrial oxidative phosphorylation activated by animal exposure to immobilization stress are investigated. Following a preliminary immobilization for periods of 5 to 24 hours, rats were exposed to an air ionizer producing negative ions at concentrations of about 250,000/cu cm for a period of 10 min, after which rat liver mitochondria were separated and their respiratory parameters were monitored for up to 50 min. Rates of phosphorylative metabolism measured upon the addition of succinic acid and ADP or using endogenous substrates are found to be significantly reduced in animals breathing ionized air following immobilization by an amount approximately equal to the rise in respiratory rate observed after stressing. Results thus demonstrate that the negative air ions act on the hyperergic mitochondria resulting from stress, while having little effect on the intact organism. A.L.W.

**A82-15717 † The otolith reflex and space perception in cosmonauts (Otolitovyi refleks i funktsiia vospriiatiia prostranstva kosmonavtov).** I. Ia. Iakovleva and L. N. Kornilova. *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 3-6. 18 refs. In Russian.

The vestibular reflexes and space perception capacities of cosmonauts before and after space flights of duration 4-175 days are examined. The functions were evaluated repeatedly for up to 45 days preflight, 0-5 days post-flight and monthly in prolonged flights in 10 cosmonauts engaged in short-duration flights (4-19 days) and five in extended-duration flights (30-175 days) on board Soyuz or Soyuz-Salyut spacecraft. Whereas all but three of the subjects displayed normal, symmetric otolith response intensities and normal spatial coordinate perception accuracy, post-flight interrogation revealed the occurrence of various types of perceptual illusions in 90% of the subjects, and various types of physical discomfort in 50%. Changes in otolith functions were observed in the first or second day after flight on both groups of subjects, consisting of a hyperreflexia of the otolith reflex and the appearance of asymmetry in most, and a negative otolith reflex in the immediate post-flight period in some subjects. The space perceptual accuracy was found to be disturbed in all cosmonauts. The results may be explained as the vestibular reaction to an unaccustomedly strong stimulus and by a complex disturbance in sensory coordination. A.L.W.

**A82-15718** † **The frequency of vestibular impairments in chronic purulent medial otitis (Chastota vestibuliarnykh rasstroistv pri khronicheskom gnoinom srednem otite).** V. T. Grinchuk and R. Chunea (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 10-12. 9 refs. In Russian.

**A82-15719** † **Rhinopneumometric indicators during repeated antiorthostatic exposures (Pokazateli rinopnevmometrii pri povtornykh antiortostaticheskikh vozdeistviiakh).** V. P. Baranova and I. Ia. Iakovleva. *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 39-42. 11 refs. In Russian.

The responses of various rhinopneumometric indicators are used to evaluate the body fluid shifts taking place during repeated antiorthostatic exposures simulating weightlessness. Nasal vasomotor functions were monitored rhinopneumometrically in 30 healthy male subjects undergoing three series of repetitive antiorthostatic exposures: passive antiorthostasis on a tilt table for a period of 20 min every 1 or 2 days for a month; sleep at a head-down tilt of 5 deg for 30 days; and combined antiorthostasis on a tilt table while performing gymnastic exercises for a month. Analysis of the results indicates that intranasal resistance during antiorthostasis accurately reflects the blood redistribution to the upper half of the body taking place during adaptation to the unaccustomed gravitational conditions. A.L.W.

**A82-15720** † **Evaluation of natural convection under hyperbaric conditions (Otsenka estestvennoi konvektaii v giperbaricheskikh usloviiakh).** V. S. Koshcheev, M. A. Razran, and G. G. Ter-Akopian. *Gigiena i Sanitariia,* Aug. 1981, p. 20-22. In Russian.

The mobilities and heat transfer capacities of media in a closed volume under various pressures are investigated in a study of human thermal protection requirements at elevated pressures. A method of direct heat loss measurements involving the determination of temperature differences in the wake above an object giving off heat was used to compare the convective heat loss from humans wearing different types of clothing under different atmospheric pressures. Measurements with a calibrated heat source reveal that the bulk velocity of the gaseous medium decreases significantly with increasing pressure, thus complicating the thermographic measurements at pressures greater than 1 MPa. When used at pressures between 0.15 and 0.5 MPa, the method reveals the removal of clothing at pressures close to normal to lead to an insignificant increase in convective heat loss (less than 9%) at room temperature, while elevated pressures (0.4-0.5 MPa) cause an increase by 1/5 in convective heat loss from a clothed person, and by 1/3 in an exposed person. A.L.W.

**A82-15788** **Biologically damaging radiation amplified by ozone depletions.** S. A. W. Gerstl, A. Zardecki (Los Alamos National Laboratory, Los Alamos, NM), and H. L. Wiser (U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC). *Nature,* vol. 294, Nov. 26, 1981, p. 352-354. 16 refs.

A two-dimensional model is developed for the increased UV radiation impact on humans due to atmospheric ozone depletion caused by chlorofluoromethane releases into the atmosphere. The radiation amplification factor (RAF) is calculated using a data base which includes a radiative transfer code and atmospheric models. Human sunburn, erythemal, and a generalized DNA spectrum were chosen to express the damaging UV-B effects. Worldwide UV dose levels up to 70 km were included, as well as seasonal and latitudinal variations. A global 10% ozone depletion was considered, yielding an RAF from 2.1-2.5 for erythema and 2.8-3.0 for DNA, with 10% uncertainty. The percentage ozone depletion multiplied by the RAF gives the percentage increase in erythema, DNA damage, and skin cancer rates, respectively. The most probable ozone depletions are expressed as 5-10%, with the minimal depletion occurring in equatorial regions. M.S.K.

**A82-15813** **A comparison of single- and dual-task measures to predict simulator performance of beginning student pilots.** D. L. Damos (Arizona State University, Tempe, AZ) and G. Lintern (Canyon Research Group, Inc., Orlando, FL). *Ergonomics,* vol. 24, Sept. 1981, p. 673-684. 18 refs. Contract No. F44620-76-C-0009.

The predictive validity of single- versus dual-task measures in pilot performance involving timesharing skills is compared using two identical one-dimensional tracking tasks. The correlation between successive blocks of dual-task trials and performance in a simulator increased, while the correlation between successive early single-task trials and simulator performance decreased. The last two single-task trials, however, showed a large increase in predictive validity. A control theory analysis of selected single- and dual-task scores suggests that a multiple-task response was employed on the last two single-task trials, resulting in correlations between these trials and the simulator test comparable to those of late dual-task practice. Methodological problems associated with repeated measures designs are pointed out where the workload varies between single- and dual-task conditions. D.L.G.

**A82-15851** **Human factors of outer space production.** Edited by T. S. Cheston (Georgetown University, Washington, DC) and D. L. Winter. Boulder, CO, Westview Press, Inc. (AAAS Selected Symposia Series. Volume 50). 1980. 230 p. $18.50.

The changing requirements and opportunities of space-based activities due to the operational capabilities of the Shuttle, the heterogeneity of Shuttle and space construction crews, lengthier stays in space, advancements in technology, and economic horizons are discussed. Aspects of long duration space flights are considered in terms of the psychological considerations for crew members and space inhabitants, the possibilities for closed food cycles and nutrient requirements, and the design of space habitats, along with methods of personnel selection for psychological adaptivity and competence, new privacy necessities, and physiological changes due to weightlessness. Man-machine interfaces and the use of phytotrons to study environmental requirements of plants in space are explored, and the economic factors of outer space production and communication facilities are examined. M.S.K.

**A82-15852** * **Psychological considerations in future space missions.** R. L. Helmreich, J. A. Wilhelm, and T. E. Runge (Texas, University, Austin, TX). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 1-23. 50 refs. Grant No. NsG-2065.

Issues affecting human psychological adjustments to long space missions are discussed. Noting that the Shuttle flight crewmembers will not have extensive flight qualification requirements, the effects of a more heterogeneous crew mixture than in early space flights is considered to create possibilities of social conflicts. Routine space flight will decrease the novelty of a formerly unique experience, and the necessity of providing personal space or other mechanisms for coping with crowded, permanently occupied space habitats is stressed. Women are noted to display more permeable personal space requirements. The desirability of planning leisure activities is reviewed, and psychological test results for female and male characteristics are cited to show that individuals with high scores in both traditionally male and female attributes are most capable of effective goal-oriented behavior and interpersonal relationships. Finally, it is shown that competitiveness is negatively correlated with the success of collaborative work and the social climate of an environment. M.S.K.

**A82-15853** **Future directions for selecting personnel.** K. Natani (USAF, School of Aerospace Medicine, Brooks AFB, TX). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 25-63. 135 refs.

Experiences with Antarctic research station crew members is applied to selection procedures for space crew members. EEG tests are shown to give adequate measurements of stress levels, while multiple input-multiple response tasks reveal changes in selective attention due to physiological compensator reactions; brain hemispheric lateralization tests are noted to show underlying neutrometric degradations due to stress. The goal is to actively identify individuals with adaptively competent personalities, who will use skills and techniques effectively to reduce risk levels to which they are exposed. Nonadaptive behavior is emphasized as a potentially dangerous character trait in a novel environment, and the 45% occurrence rate of pilot error in aircraft accidents is cited. Finally, isolated duty for extended periods is known to cause personality changes, with symptoms of mental illness present during a transition phase; a favorable outcome to the transition results in an individual with greater psychological integrity. M.S.K.

**A82-15854** **Well-being and privacy in space - Anticipating conflicts of interest.** J. E. Sieber (California State University, Hayward, CA). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 65-78. 15 refs.

The concept of privacy is explored for means of anticipating changing privacy requirements by long term space inhabitants. Because cultural and situational conditions of privacy vary throughout the world, it is suggested that space travellers will establish their own criteria for personal sharing and the control of the flow of information about their lives. A developmental theory of privacy is reviewed, and a breach of privacy is regarded as a form of stress. Failure to adjust to a new environment which causes stress results in an unsuccessful adaptation syndrome, producing measurable physiological changes, e.g. loss of muscle tone or high blood pressure. The effects of stress can affect the stability of fellow workers and the level of work quality, factors which can be catastrophic in a space environment. The possibilities of enhancing the opportunities for stress by continuous monitoring of the physiological state of space inhabitants through telemetry are discussed. M.S.K.

**A82-15855** **Habitat requirements, design and options.** R. L. Kline (Grumman Aerospace Corp., Bethpage, NY). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 79-96.

The steps to permanent human habitations in LEO and GEO are outlined, and the functions and shelter of man in space for long time periods are examined. Space observation and space processing missions will lead to use of orbital cherry pickers, both open and closed, a manned orbit transfer vehicle (MOTV), and eventually to self contained habitats, along with shelters for times of solar flares. Radiation protection requirements for LEO and GEO habitats are defined, noting that the use of tantalum on the inside hull of a GEO habitat will impose weight penalties for the MOTV. Rescue operations from GEO to MOTV to Shuttle to earth are noted to require at least six days, while severely ill persons could be transported in a GEO direct-to-earth lifeboat in six hours. M.S.K.

**A82-15856 *** **Nutritional criteria for closed-loop space food systems.** P. C. Rambaut (NASA, Washington, DC). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 113-131. 12 refs.

The nutritional requirements for Skylab crews are summarized as a data base for long duration spaceflight nutrient requirements. Statistically significant increases in energy consumption were detected after three months, along with CO2/O2 exhalation during exercise and thyroxine level increases. Linoleic acid amounting to 3-4 g/day was found to fulfill all fat requirements, and carbohydrate and protein (amino acid) necessities are discussed, noting that vigorous exercise programs avoid deconditioning which enhances nitrogen loss. Urinary calcium losses continued at a rate 100% above a baseline figure, a condition which ingestion of vitamin D2 did not correct. Projections are given that spaceflights lasting more than eight years will necessitate recycling of human waste for nutrient growth, which can be processed into highly efficient space food with a variety of tastes. M.S.K.

**A82-15857 *** **Rationale for evaluating a closed food chain for space habitats.** M. Modell (MIT, Cambridge, MA) and J. M. Spurlock (Georgia Institute of Technology, Atlanta, GA). In: Human factors of outer space production. Boulder, CO, Westview Press, Inc., 1980, p. 133-145. 10 refs. NASA-sponsored research.

Closed food cycles for long duration space flight and space habitation are examined. Wash water for a crew of six is economically recyclable after a week, while a total closed loop water system is effective only if the stay exceeds six months' length. The stoichiometry of net plant growth is calculated and it is shown that the return of urine, feces, and inedible plant parts to the food chain, along with the addition of photosynthesis, closes the food chain loop. Scenarios are presented to explore the technical feasibility of achieving a closed loop system. An optimal choice of plants is followed by processing, waste conversion, equipment specifications, and control requirements, and finally, cost-effectiveness. M.S.K.

# STAR ENTRIES

**N82-12129*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**CREW ACTIVITIES IN SPACE**
Guion S. Bluford, Jr. *In* NASA. Marshall Space Flight Center Spacecraft Dyn. as Related to Lab. Expt. in Space Nov. 1981 p 181-187
Avail: NTIS HC A10/MF A01 CSCL 05H

One of the mission requirements of the Space Shuttle is to serve as a working platform for experiments in space. Many of these experiments will be performed by crewmembers (mission specialists and payload specialists) in a general purpose laboratory called Spacelab. All nonexperiment-related activities or housekeeping activities will be done in the Orbiter, while most of the mission-related activities (experiments) will be done in Spacelab. In order for experimenters to design their experiments to best utilize the capabilities of the Orbiter, the Spacelab, and the crew, the working environment in the Orbiter and in Spacelab is described. In addition, the housekeeping activities required of the crew are summarized. T.M.

**N82-12737** Utah State Univ., Logan.
**HIGHER PLANT ACCLIMATION TO SOLAR ULTRAVIOLET-B RADIATION Ph.D. Thesis**
Ronald Robberecht 1981 109 p
Avail: Univ. Microfilms Order No. 8121390

Plant acclimation to natural and intensified solar UV-B irradiance was investigated in three species, to determine: (1) the relationship between plant sensitivity and epidermal UV attenuation, (2) the effect of phenotypic changes in the leaf epidermis, resulting from UV-B exposure, on plant sensitivity to UV radiation, and (3) the plasticity of these changes in the epidermis leading to plant, acclimation to UV-B radiation. Epidermal UV transmittance was found to differ in magnitude and spectral distribution among the three species. Photosynthesis was not significantly depressed in the leaves of any of three species. A trend toward photosynthetic depression of response to UV-B irradiation was found. A mechanism of UV-B attenuation, and increase in the UV-B attenuation capacity of the epidermis, is suggested. It is suggested that the degree of plant sensitivity and acclimation to natural and intensified solar UV-B radiation involves a dynamic balance between the capacity for UV-B attenuation and UV-radiation repair mechanism in the leaf. Dissert. Abstr.

**N82-12738#** Norwegian Defence Research Establishment, Kjeller.
**NEUROTRANSMITTER MECHANISMS IN THE NUCLEUS ACCUMBENS SEPTI AND RELATED REGIONS IN THE RAT BRAIN**
Ivar Walaas Apr. 1981 26 p refs
(NDRE/PUBL-81/1001; ISSN-0085-4301) Avail: NTIS HC A03/MF A01

The localization of different transmitter candidate, particularly the amino acids gamma aminobutyrate (GABA) and glutamate (GLU), in limbic and basal ganglia regions in the rat brain was compared and the characteristics of nucleus accumbens were studied. The GABA neurons are found in nucleus accumbens, and GABA projections from this nucleus are identified in restricted basal forebrain and mesencephalic regions. The GLU projections from the neocortex or allocortex are terminated in nucleus accumbens and other forebrain and hypothalamic nuclei. Neurotransmitters in local neurons are identified in the hippocampus, nucleus accumbens, septum and caudatoputamen by local kainic acid injections, while neurons in the mediobasal hypothalamus are studied after systemic treatment of newborn animals with monosodium glutamate. E.A.K.

**N82-12739*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**METHOD AND APPARATUS FOR DETECTING COLIFORM ORGANISMS Patent Application**
Kenji Nishioka, David Nibley (Boeing Co., Palo Alto, Calif.), Eldon Jeffers (Boeing Co., Palo Alto, Calif.), and Richard Brooks, inventors (to NASA) (Boeing Co., Palo Alto, Calif.) Filed 26 Oct. 1981 25 p
(NASA-Case-ARC-11322-1; US-Patent-Appl-SN-315278) Avail: NTIS HC A02/MF A01 CSCL 06C

A sample containing coliform bacteria is cultured in a liquid growth medium. The cultured bacteria produce hydrogen which is vented to a second cell containing a buffer solution in which the hydrogen dissolves. By measuring the potential change in the buffer solution caused by the hydrogen, as a function of time, the initial concentration of bacteria in the sample is determined. Alternatively, the potential change in the buffer solution can be compared with the potential change in the liquid growth medium to verify that the potential change in the liquid growth medium is produced primarily by the hydrogen gas produced by the coliform bacteria. NASA

**N82-12740#** Technische Hogeschool, Delft (Netherlands).
**AN ENGINEERING STUDY OF BACTERIAL KINETICS AND ENERGETICS Ph.D. Thesis**
A. A. Esener 1981 130 p refs
Avail: NTIS HC A07/MF A01

Bacterial kinetics and energetics were studied with reference to engineering applications. Three processes were identified: (1) to biosynthetic process during which presursors are formed from the substrate followed by the polymerization of them into biomass; (2) product formation; and (3) the maintenance processes. The distribution of the input energy and mass in the form of the substrate was studied in an attempt to manipulate the distribution so as to minimize the overall cost of the product. This was accomplished by describing the whole process in terms of a mathematical model and optimizing it according to an objective function. R.J.F.

**N82-12741#** International Atomic Energy Agency, Vienna (Austria).
**GASTROINTESTINAL ALLERGY IN THE EXPERIMENTAL ANIMAL: THE USE OF RADIOIODINATED SERUM ALBUMIN IN THE ASSESSMENT OF NEW DRUGS Final Report, 15 Oct. 1977 - 30 Nov. 1979**
S. Freier Mar. 1980 24 p refs
(IAEA-R-2067-F) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

A rat model to study of gastrointestinal allergy and means to prevent it was developed. Allergic sensitivity to certain proteins by injecting proteins and adjuvants in various regimes was induced in rats. For suckling rats sensitivity was established by oral administration of the protein. A hypersensitive gastrointestinal reaction to challenge was demonstrated by electron microscopy, by light microscopy with conventional staining techniques, and by a radionuclide procedure wherein (51) Cr labelled albumin injected intravenously shortly before the challenge concentrated in the intestinal walls in rough proportion to the severity of the reaction. It is found that suppressing the hypersensitive intestinal reaction, disodium cromoglycate, dexamethazone, aspirin, indomethecan, and ipobrufen are ineffective and aminophylline was a slight amelioration. DOE

**N82-12742#** Technische Universitaet, Munich (West Germany). Institut fuer Klinische Zytologie.
**COMPILATION OF CELL DATA BANK FOR AUTOMATION IN DIAGNOSTIC CYTOLOGY Final Report**
Karlheinz Otto Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 30 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-158; ISSN-0340-7606) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,30

Automated cell recognition systems with high resolution which are required to analyze separate cells to detect cellular margins are discussed. Classified cells are used for compiling a learning data set. The preparation technique was improved, aiming at sufficient cellular isolation. In order to create a learning data set, 10,000 isolated cells were selected. The preparation procedure entails a distinct increase of isolated squamous epithelial cells and a diminution of clusters as well as white blood cells. The significance of specific and stoichiometric staining is shown. Author (ESA)

**N82-12743#** Medical Biological Lab. RVO-TNO, The Hague (Netherlands).

**CHEMICAL PROTECTION OF CELLS IN CULTURE AND MICE AGAINST X-IRRADIATION Progress Report**

O. Vos and L. Budke Jan. 1979 16 p
(MBL-1979-2; TDCK-71758) Avail: NTIS HC A02/MF A01

The effects of X-rays on the survivability of mice and cells in culture is discussed. Clone formation of heteroploid kidney cells in vitro was used as the survival parameter for the cells. Two germanied thiazolidines give good results, even though the effectiveness level of cysteamine is not reached. Author (ESA)

**N82-12745** Pennsylvania State Univ., University Park.

**SWEATING RESPONSES OF MEN AND WOMEN DURING EXERCISE IN HUMID AND DRY HEAT Ph.D. Thesis**

Andrea Jean Frye 1981 80 p
Avail: Univ. Microfilms Order No. 8120427

Four men and four women were matched on aerobic capacity and surface area to weight ratio. Each subject was acclimated to and tested in two equivalent environments (dry bulb temperature and wet bulb temperature). Maximum density of sweat gland activation (SGA sub max) was determined with the use of methacholine. Suppression of sweating due to skin hydration (hidromeiosis) was evidenced in both sexes by significantly lower total body sweat rate (m sub sw) and chest sweat rate (m sub sw) in the humid heat as compared to the dry heat. The women maintained significantly lower M sub sw and chest m sub sw than the men in the humid heat, but there were no differences in sweating rates between sexes in the dry heat. In the women, the SGA relative to SGA sub max) (% SGA sub max) was significantly higher in the dry heat than in the humid heat. SGF was similar in both environments. In the men, SGF was significantly higher in the dry heat than in the humid heat, while %SGA sub max was similar in both environments. The women were more sensitive to hidromeiosis than the men, and the nature of the response to hidromeiosis differed between the sexes. Dissert. Abstr.

**N82-12746** Texas Univ. at San Antonio.

**MEDICAL DIAGNOSTIC APPLICATION OF RADIOFREQUENCY RANGE ELECTROMAGNETIC WAVES Ph.D. Thesis**

Michael Raymond Millner 1981 139 p
Avail: Univ. Microfilms Order No. 8120287

A method has been developed, using a scattering or S parameter network analyzer and a loop antenna, for measuring the phase change of the forward reflection S parameter, S11, in relation to volume changes. A phantom was designed utilizing a balloon immersed in saline with displacement volume measured in a standpipe. Volume changes were related to both changes in phase and amplitude of the S11. A model was developed, based on basic electromagnetic theory, of a wave propagating through a layer of water of varying thickness bounded by air. The complex reflection coefficient was calculated, plotted, and compared to the S11 for the phantom. Several different antenna designs were tested, including varying size and types. This method was applied to the study of breathing and cardiac volume changes in man. Both the amplitude and phase of the S11 parameter were correlated with a simultaneously recorded electrocardiogram. In order to correlate these measurements with cardiac volume changes, a dog was anesthetized, and by means of the thermal dilution technique, cardiac output was determined. Dissert. Abstr.

**N82-12747** California Univ., Los Angeles.

**MEASUREMENT OF THE BONE MINERAL DENSITY OF TRABECULAR BONE BY A COHERENT AND COMPTON SCATTERING TECHNIQUE Ph.D. Thesis**

Shih-Shen Ling 1981 170 p
Avail: Univ. Microfilms Order No. 8120996

A simplified photon scattering method to measure the bone mineral density of the trabecular bone was studied. The method used the simultaneous detection of the coherent and Compton scattered photons from the bone sample in a narrow beam geometry. The bone mineral density is determined within the scattering volume which is defined by the configuration of the source and detector collimators and scattering angle. The size of the scattering volume is determined by the aperture diameter and the length of both the source and detector collimators for a geometric configuration, and scattering angle. The corrections to the coherent to Compton scattering ratio due to the presence of overlying tissue and the effect of fat content of the sample to this technique was also studied. A four source focused collimator was constructed to increase the incident photon intensity. Dissert. Abstr.

**N82-12748** California Univ., Los Angeles.

**THE MAGNETOSTATIC FORCE PRODUCED BY CURRENT LOOPS AND IS MEDICAL APPLICATIONS Ph.D. Thesis**

Osman Kaldirim 1981 132 p
Avail: Univ. Microfilms Order No. 8120984

The magnetostatic force on permeable bodies both theoretically and experimentally was studied. Recent technological advances are tremendously advantageous to the delivery of protein carrying biologically active substances. The use of magnetic fields serves as the driving force in a guidance system to transport these substances to specific sites within the living system. Spheres of protein approximately one micron in diameter are impregnated with magnetite (Fe3O4) along with other desired substances, this combination of elements is then injected into the bloodstream. Once in the bloodstream they flow freely until the desirable site is reached. The magnetic fields and manetostatic forces which are necessary in the control of microspheres were analyzed. A theoretical analysis of the magnetostatic force due to current loops was made consisting of a systematic design and an experimental study involving the effects of magnetostatic forces on microspheres injected into animals. Dissert. Abstr.

**N82-12749** Colorado Univ. at Boulder.

**TRANSCUTANEOUS ELECTRICAL PERIPHERAL NERVE STIMULATION: IMPLICATIONS FOR NEURAL CONTROL MECHANISMS Ph.D. Thesis**

Darrell Neal Jones 1981 158 p
Avail: Univ. Microfilms Order No. 8122295

Transcutaneous electric nerve stimulation (TENS) is used clinically to control chronic pain. Large nerve fiber activity which is induced by TENS is hypothesized to inhibit pain signals at spinal levels via the gate control mechanism. While TENS is highly effective in the control of chronic pain, few additional neural function effects are reported clinically. The paucity of such observations is enigmatic since the large fiber involvement characteristic of TENS impacts numerous peripheral neural functions. A battery of performance tests was given to volunteers under control conditions and acute clinical levels of TENS. The tests included reaction time tests, force estimation tasks, touch discrimination tests and temperature discrimination tests. The results show no significant TENS effects on sensory discrimination. However, TENS significantly affects motor function, as defined by slowed reaction times and reduced range of response in force estimation. Dissert. Abstr.

**N82-12750** California Univ., San Diego.

**THREE-DIMENSIONAL STRESS DISTRIBUTION IN ARTERIES: RADIAL COMPRESSION EXPERIMENTS OF ARTERIAL WALL; STRESS CONCENTRATION IN LUNG NEAR A CYLINDRICAL CAVITY; FINITE ELEMENT ANALYSIS OF PLEURAL SURFACE PRESSURE DISTRIBUTION IN DOG'S LUNG DURING ELECTROPHRENIC STIMULATION Ph.D. Thesis**

Cheng-Jen Chuong 1981 167 p
Avail: Univ. Microfilms Order No. 8120521

A three dimensional stress strain relationship derived from a strain energy function of the exponential form was proposed for arterial wall. The effect of the nonuniform stress field in the radial direction on the water movement in arterial wall is pointed out. The elastic behavior of rabbit thoracic arteries in radial direction was studied by uniaxial compression order of magnitude of the elasticity in radial direction is the same as that in the circumferential and longitudinal directions. In the vicinity of cylindrical cavity the lung parenchyma can be subjected to very high stress concentration in the circumferential direction. Stress distributions at various infinity stretches as well as longitudinal stretches are given. During the electrophrenic stimulation the diaphragm contracts lowers and the apex t base length of the lung increase up to 25%. It is observed that reversal pleural pressure (p sub pl) gradient in which the basal p sub pl becomes more negative than the optical. This phenomena is studied by finite element method. Dissert. Abstr.

**N82-12751*#** BioTechnology, Inc., Falls Church, Va.

**BIOMEDICAL RESEARCH**

Washington NASA Nov. 1981 20 p
(Contract NASw-3469)
(NASA-CR-3487) Avail: NTIS HC A02/MF A01 CSCL 06B

Biomedical problems encountered by man in space which have been identified as a result of previous experience in simulated or actual spaceflight include cardiovascular deconditioning, motion sickness, bone loss, muscle atrophy, red cell alterations, fluid and electrolyte loss, radiation effects, radiation protection, behavior, and performance. The investigations and the findings in each of these areas were reviewed. A description of how biomedical research is organized within NASA, how it is funded, and how it is being reoriented to meet the needs of future manned space missions is also provided. T.M.

**N82-12752*#** General Electric Co., Houston, Tex. Apollo Systems Dept.
**QUANTITATION OF TISSUE LOSS DURING PROLONGED SPACE FLIGHT**
J. I. Leonard 24 Sep. 1979 44 p refs
(Contract NAS9-15487)
(NASA-CR-167460; TIR-74-LSP-9017) Avail: NTIS HC A03/MF A01 CSCL 06P

Data from Skylab missions related to tissue loss in space were analyzed. Significant changes in gross body composition occur during spaceflight, these include: alterations in water balance resulting from headward shifts of fluid, loss of musculoskeletal tissue, and alterations in fat depending upon the balance between caloric intake and energy expenditure. An effort was made to control the more essential components of body weight on the Skylab missions. E.A.K.

**N82-12753*#** General Electric Co., Houston, Tex.
**SKYLAB WATER BALANCE ANALYSIS**
J. I. Leonard 13 Apr. 1977 59 p refs
(Contract NAS9-14523)
(NASA-CR-167461) Avail: NTIS HC A04/MF A01 CSCL 06P

The water balance of the Skylab crew was analyzed. Evaporative water loss using a whole body input/output balance equation, water, body tissue, and energy balance was analyzed. The approach utilizes the results of several major Skylab medical experiments. Subsystems were designed for the use of the software necessary for the analysis. A partitional water balance that graphically depicts the changes due to water intake is presented. The energy balance analysis determines the net available energy to the individual crewman during any period. The balances produce a visual description of the total change of a particular body component during the course of the mission. The information is salvaged from metabolic balance data if certain techniques are used to reduce errors inherent in the balance method. E.A.K.

**N82-12754#** Technische Hogeschool, Delft (Netherlands).
**IDENTIFICATION OF THE ADAPTIVE FEEDBACK OF THE HUMAN MOTOR SYSTEM USING THE RESPONSE DIFFERENCE METHOD Ph.D. Thesis**
Anthonie Pieter Eland Jun. 1981 132 p refs Sponsored in part by the Netherlands Organization for the Advancement of Pure Research
Avail: NTIS HC A07/MF A01

Proprioceptive and the visual feedback of the human motor system in generating slow, goal directed movement was investigated. Two internal models are considered in the feedforward path. The sensory program specifies the expected position trajectory and its maximum velocity which explains the amplitude and the duration of the movement. The motor program is determined by the sensory program and the load's internal model and specific the amplitude and the duration of the force pattern. Learned goal directed movements are almost completely programmed. E.A.K.

**N82-12755#** Desmatics, Inc., State College, Pa.
**A MONTE CARLO STUDY OF THE USE OF AUXILIARY INFORMATION IN THE DEVELOPENT OF AN IMPACT ACCELERATION INJURY PREDICTION MODEL**
Dennis E. Smith and John J. Peterson Sep. 1981 14 p refs
(Contract N00014-79-C-0128; NR Proj. 207-037)
(AD-A105463; TR-112-9) Avail: NTIS HC A02/MF A01 CSCL 06/19

This report describes a small-scale Monte Carlo investigation of procedures for incorporating various sources of auxiliary information into an impact acceleration injury prediction model. Parameter estimates are tabulated and compared for standard and modified models. Based on the results of the investigation, the procedures appear to be helpful in reducing the mean square error of predictions. Author (GRA)

**N82-12756#** Arizona Univ., Tucson. Dept. of Pharmacology.
**OXYGEN TOXICITY AND LUNG COLLAGENOUS PROTEIN Final Technical Report, 1 Sep. 1977 - 28 Feb. 1981**
Klaus Brendel and I. Glenn Sipes 28 Feb. 1981 131 p refs
(Contract N00014-77-C-0506)
(AD-A104702) Avail: NTIS HC A07/MF A01 CSCL 06/20

The chemical composition and subunit structure of the basement membrane and collagenous components of the normal lung and of lungs exposed to agents promoting the formation of singlet oxygen and thereby produce oxidative damage to tissue components was investigated. The alveolar basement membrane, the structure and composition of this component of the extracellular matrix of the lung is determined that a complex population of proteins make up the extracellular matrix. Several new collagen types are described as well as high molecular weight non collagens that appear to be associated with normal basement membranes. It is concluded that the characterization of putative changes in the nature of matrix components in pathologic states lags behind a more thorough characterization of normal basement membrance and extracellular components. E.A.K.

**N82-12757#** Brookhaven National Lab., Upton, N. Y.
**REPAIR OF CHEMICAL DAMAGE IN MAMMALIAN CELLS**
R. B. Setlow 1981 10 p refs Presented at the NATO CNEN Conf., Rome, 24 Aug. - 5 Sep. 1981 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE81-030823; BNL-30055; B10-3767; CONF-810873-1)
Avail: NTIS HC A02/MF A01

The repair of chemical damage to DNA is discussed. Most chemicals of environmental concern do not react directly with cellular macromolecules but must first be activated to nucleophiles. The different reactivities between agents reacting directly and those that react indirectly may produce products whose yields as a function of dose are completely different even though the products themselves may be the same. Nucleotide excision measurements of DNA repair are used extensively to detect agents that react with DNA which measurements help identify dangerous DNA adduct. The chemical damages that mimic UV are repaired by nucleotide excision, and the chemicals give rise to bulky adducts. The excision repair of bulky DNA adducts mimics the repair of UV damage in many ways, however the identity of the repair pathways is still controversial. DOE

**N82-12758#** Atomic Energy of Canada Ltd., Chalk River (Ontario). Health Sciences Div.
**BIOLOGICAL EFFECTS OF LOW DOSES OF IONIZING RADIATION: THREE REVIEW PAPERS**
J. D. Childs and J. R. Johnson Sep. 1980 81 p refs
(AECL-7059) Avail: NTIS (US Sales Only)HC A05/MF A01; DOE Depository Libraries

The topics relate to the genetic effects of ionizing radiation. The dose-response relationship for the genetic and carcinogenic effects of low level radiation is discussed. A perspective on radiation exposures resulting from the use of nuclear energy is presented. T.M.

**N82-12759#** Atomic Energy of Canada Ltd., Pinawa (Manitoba).
**RADIATION EFFECTS ON LIVING SYSTEMS. A BIBLIOGRAPHY OF AECL PUBLICATIONS**
Norma J. Hawley Oct. 1980 38 p In ENGLISH; FRENCH summary
(AECL-6797) Avail: NTIS HC A03/MF A01

The bibliography is divided into three topic areas: radiobiology, radiation chemistry, and radiation biochemistry. The living systems are arranged as follows: animals, cellular, human, insects, and subcellular. T.M.

**N82-12760#** North Carolina Univ., Chapel Hill. Dept. of Biochemistry.
**STUDIES IN ERYTHROPOIESIS: THE INFLUENCE OF THE GLYCOCALYX OF THE RED CELL MEMBRANE Ph.D. Thesis**
M. W. Franco 1980 148 p refs

(Contracts DE-AS05-76EV-04157; EY-76-S-05-4157)
(DE81-030668; DOE/EV-04157/T3) Avail: NTIS HC A07/MF A01

The correlation between the removal from the circulation of aged cells and the production of new RBCs was investigated. An erthropoietic influence was associated with the glycocalyx of the erythrocyte membrane. The influencing factor, asialoglycophorin, was masked on the young RBC by an amino ketosugar, sialic acid. During the aging process, an increasing amount of sialic acid is removed from the membrane to expose the underlying erythropoietic message. The amount of erythropoietic activity was directly related to the number of desialated erythrocytes transfused and to the degree of desialation of the transfused erythrocytes. It is shown that asialoglycophorin is an erythrocyte stimulating factor following its isolation from the membrane and subsequent injection into test mice and both mouse and human asialoglycophorin and stimulatory. DOE

**N82-12761#** Australian Radiation Lab., Melbourne.
**MEASUREMENT OF GONADAL AND BONE-MARROW DOSES FROM DENTAL RADIOGRAPHY**
S. B. Solomon and N. D. Morris Jun. 1980 30 p
(ARL/TR-022; ISSN-0157-1400) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The method of calculation of the radiation doses to the gonads and to the active bone marrow arising from dental radiography is described. The bone-marrow doses have been calculated using a computer model of X-ray depth doses within the skull for typical dental radiographic examinations as performed in Australia. The ovarian and testicular doses, as a percentage of skin dose have been determined experimentally. The dependence of the gonadal doses on X-ray tube voltage, face to cone distance and direction of the X-ray beam relative to the face is detailed. DOE

**N82-12762#** Australian Radiation Lab., Melbourne.
**GONADAL DOSES FROM RADIOTHERAPY**
S. B. Solomon and N. D. Morris Jun. 1980 25 p
(ARL/TR-020; ISSN-0157-1400) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The measurement of scatter factors to the gonads from superficial and deep therapy is detailed and the analytic fits to the experimental data, as a function of field position, field size and beam energy are given. The data used to calculate the gonadal doses from treatments using linear accelerators, teletherapy and sealed sources are described and the analytic fits to the data given. DOE

**N82-12763#** Australian Radiation Lab., Melbourne.
**GENETIC AND MEAN BONE-MARROW DOSES FROM MEDICAL USE OF UNSEALED RADIOISOTOPES**
D. W. Keam Jun. 1980 21 p refs
(ARL/TR-023; ISSN-0157-1400) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Annual doses to the Australian population were derived for the year 1970 using results of a survey carried out at that time and published data on doses to individuals resulting from such use. Values of 3.9 and 38 microgray for the annual (per capita) genetic and mean bone marrow doses respectively are reported, which are similar to those reported for other countries at about that time. DOE

**N82-12764#** Australian Radiation Lab., Melbourne.
**CONTRIBUTIONS TO THE GENETIC AND MEAN BONE-MARROW DOSES OF THE AUSTRALIAN POPULATION FROM RADIOLOGICAL PROCEDURES**
T. N. Swindon and N. D. Morris Jun. 1980 111 p
(ARL/TR-017) Avail: NTIS (US Sales Only) HC A06/MF A01; DOE Depository Libraries

The results of a national survey of radiological procedures used for diagnosis and therapy in medicine, dentistry, and chiropracty are reviewed. Statistical data for the distribution and frequency of various procedures in Australian hospitals and practices are summarized, together with their associated radiation doses. Annual genetically significant and mean bone-marrow doses to the Australian population arising from these procedures are derived for the survey year of 1970. Values of 176 microgray and 651 microgray for the annual (per capita) genetic and mean bone-marrow doses respectively are reported. These compare closely with corresponding estimates in other countries with similar medical practices to those in Australia. DOE

**N82-12765#** Oak Ridge National Lab., Tenn.
**OVERVIEW OF THE BIOMEDICAL AND ENVIRONMENTAL PROGRAMS AT THE OAK RIDGE NATIONAL LABORATORY**
H. A. Pfuderer, comp. and J. B. Moody, comp. Jul. 1981 82 p
(Contract W-7405-eng-26)
(DE81-027864; ORNL-5808) Avail: NTIS HC A04/MF A01

Biomedical and environmental research, to provide information on environmental, health, and safety considerations, which can be utilized in the formulation and implementation of energy technology decisions is discussed. Information for the understanding of short term and long term consequences of processes in new energy technologies were researched. The mechanisms responsible for biological and ecological damage caused by substances associated with energy production and repair mechanisms are investigated. DOE

**N82-12766#** Texas A&M Univ., College Station. Dept. of Chemistry, Medical Microbiology and Immunology.
**IDENTIFICATION AND TOXICITY OF FRACTIONATED-SHALE-OIL COMPONENTS**
K. Wittnebel, D. C. Shelly, C.-N. Ho, I. M. Warner, and J. M. Quarles 1981 17 p refs
(Contract DE-AS05-80EV-10404)
(DE81-028460; DOE/EV-10404/T1) Avail: NTIS HC A02/MF A01

A procedure for the separation and identification of polynuclear aromatic hydrocarbons (PNAs) is presented. This procedure comprises two steps. First, the shale oil is separated into fractions according to ring size on a Chromosorb LC-9 normal phase column. Then each of these fractions are separated into individual components and identified using an analytical reversed-phase Ultrasphere ODS 5 micrometer column. In addition, toxicity studies are carried out on each fraction obtained from the amine column to indicate which class of PNAs warrants special attention and analysis. The results of this approach are reported. T.M.

**N82-12767#** Netherlands Organization for Applied Scientific Research TNO, Delft. Raad voor Gezondheidsresearch TNO.
**INVENTORY OF MEDICAL TECHNOLOGICAL RESEARCH IN THE NETHERLANDS Annual Report, 1979-1980 [INVENTARISATIE VAN HET MEDISCH-TECHNOLOGISCHE ONDERZOEK IN NEDERLAND 1979-1980]**
J. G. A. Luijten May 1980 73 p In DUTCH
Avail: NTIS HC A04/MF A01

An inventory of medical-technological research in the Netherlands during the years 1979 and 1980 is presented. The research projects are listed with title, contact person, year of beginning and termination and number of man years. Author (ESA)

**N82-12768#** National Physical Lab., Teddington (England). Acoustics Unit.
**THRESHOLDS OF HEARING BY AIR CONDUCTION AND BY BONE CONDUCTION UNDER DIFFERENT MASKING CONDITIONS**
M. S. Shipton and D. W. Robinson Jun. 1981 46 p refs
(NPL-Ac-100; ISSN-0143-7143) Avail: NTIS HC A03/MF A01

Air and bone conduction threshold determinations for 152 subjects in the age range 18 to 30 years are presented. Bone conduction tests were carried out using a vibrator applied to the left and right mastoid under three conditions at the contralateral ear: unoccluded, masked at 25 dB, and at 40 dB sensation level. By a systematic process of otological classification of the subjects, the bone conduction threshold for normal hearing was estimated with an uncertainty of less than 1 dB and was interpolated for masking noise levels from zero to 40 dB sensation level. Individual air-bone gaps are shown to be widely spread for an otologically normal group, but distributions are normal and have a mean value close to zero. Author (ESA)

**N82-12769#** National Physical Lab., Teddington (England). Acoustics Unit.
**AN INVESTIGATION OF THE STATUS OF BONE CONDUCTION AUDIOMETER CALIBRATION IN THE NATIONAL HEALTH SERVICE**
G. R. Torr and L. S. Whittle Jun. 1981 45 p refs
(NPL-Ac-101; ISSN-0143-7143) Avail: NTIS HC A03/MF A01

The accuracy and uniformity achieved in the calibration of bone conduction audiometers used in hospitals were studied. The acceleration output of precalibrated bone vibrator supplied as part of an audit kit was measured. the precalibration of the bone vibrator is on the order of 2 dB at all test frequencies, although the differences between the individual results and precalibration attained 5 dB at extreme frequencies in a few cases. However, differences are substantially reduced by reinterpreting the hospital measurements using determinations of the sensitivities of the artificial mastoids and by correcting the measurements to a common temperature. Author (ESA)

**N82-12770#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### THE HEART RATE OF ASPIRANT AIR PILOTS IN A HYPOBARIC CHAMBER

A. W. K. Gaillard and C. L. Truijens 1979 21 p refs
(Contract A72/K/070)
(IZF-1979-35; TDCK-73413) Avail: NTIS HC A02/MF A01

Changes in heart rate, caused by stress induced when atmospheric pressure in a hypobaric chamber is suddenly decreased, are studied. The use of heart rate variables as a pilot selection criterion is also considered. Results show that the heart rate measures only differ between a group of experienced subjects and the other groups. No correlations are found between the heart rate measures and personality test scores, which were obtained from questionnaires given directly after stress exposure. Author (ESA)

**N82-12771#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### DAMAGE RISK CRITERIA FOR IMPULSE NOISE

G. F. Smoorenburg 1980 35 p refs Presented at Intern. Symp. on New Perspectives on Noise Induced Hearing Loss, Cazenovia, New York, 15-18 Jun. 1980
(Contract A76/K/103)
(IZF-1980-26; TDCK-75018) Avail: NTIS HC A03/MF A01

Data on temporary threshold shifts (TTS) due to impulse noise exposure are evaluated. Peak levels of the impulses are determined at which only 10% of the people exposed show TTS, two minutes after exposure, of 15 dB or more averaged over the threshold shifts at 1, 2, and 3 kHz (TTS 1, 2, 3 > 15 dB). These peak levels are a function of the number of impulses per exposure times the duration of a single impulse. The result is compared with TTS data on steady noise as a function of exposure duration, and with data on permanent threshold shifts (PTS) induced by impulse and intermittent noise. This suggests that < 10% of the people exposed to impulse noise each working day will develop noise induced PTS 1, 2, 3 of 15 dB or more if the equivalent level of the noise is 85 dB. The hearing loss fence of 15 dB PTS 1, 2, 3 is discussed for loss of speech discrimination in a noisy background and it is shown that a higher fence cannot be allowed. The attenuation from ear plugs is less than laboratory values. Author (ESA)

**N82-12772*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

### PILOT ESTIMATES OF GLIDEPATH AND AIM POINT DURING SIMULATED LANDING APPROACHES

C. W. Acree, Jr. Nov. 1981 21 p refs
(NASA-TM-81325; A-8717) Avail: NTIS HC A02/MF A01 CSCL 05I

Pilot perceptions of glidepath angle and aim point were measured during simulated landings. A fixed-base cockpit simulator was used with video recordings of simulated landing approaches shown on a video projector. Pilots estimated the magnitudes of approach errors during observation without attempting to make corrections. Pilots estimated glidepath angular errors well, but had difficulty estimating aim-point errors. The data make plausible the hypothesis that pilots are little concerned with aim point during most of an approach, concentrating instead on keeping close to the nominal glidepath and trusting this technique to guide them to the proper touchdown point. Author

**N82-12773#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### HOW TO DISPLAY DIGITAL SONAR SIGNALS. SOME PRIMARY THRESHOLD MEASUREMENTS

A. vanMeeteren and A. F. Sanders 1979 20 p refs
(Contract A73/KM/032)
(IZF-1979-16; TDCK-73399) Avail: NTIS HC A02/MF A01

The optimal task division between operator and computer when trying to identify echos in sonar observation of a noisy field is discussed. Confidence ratings defined four criteria, ranging from sure no target to sure target, and results were scored as d values as a measure of detectability at the different criteria. The d values are higher towards the sure target end of the range. There are significant differences between subjects, but none for interactions between subjects and display variables. It is found that at high display thresholds the intensity mode works best, whereas at display the length mode is superior regarding target detection. Author (ESA)

**N82-12774#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### CONSPICUITY OF OBSERVATION POSTS AT THE AIR WEAPON FIRING RANGES ON THE VLIEHORS AND THE NOORDVAARDER

J. Boogaard, J. Varkevisser, and J. J. Vos 1979 20 p ref Transl. into ENGLISH of 'Opvallendheid van observatieposten op de schietranges of de Vliehors en de Noordvarrder' Soesterberg, Netherlands
(Contract A78/KLu/058)
(IZF-1979-33-E; TDCK-73411) Avail: NTIS HC A02/MF A01

Visibility from the air of observation posts is examined in order to decrease the likelihood of their being mistaken for targets. Subjective assessments by tower personnel and pilots indicate that a yellow/black check pattern has no advantages for recognition. A scale model was used to test other color/pattern combinations and the effect of a marker beacon on the tower. Results show that: (a) visibility is improved by lights of 5 million cd, while higher values cause uncomfortable glare; (b) towers should be painted black; and (c) approach route must be clearly marked. However, tower staff fear that these measures will increase danger by making them too obvious a 'target', especially in poor visibility. Author (ESA)

**N82-12775#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### CYBERNETICS AND CAR DRIVING: A MATHEMATICAL (COMPUTER) MODEL FOR THE SYSTEM TO BE CONTROLLED

G. J. Blaauw 1980 27 p refs
(IZF-1980-4; TDCK-75004) Avail: NTIS HC A03/MF A01

A mathematical representation of the system controlled by a car driver is presented. This system is defined by combinations of lateral and longitudinal vehicle dynamics, course following, and the execution of an arbitrary additional task. A linearized model is developed and implemented in subroutines on a digital computer. The model based on control theory uses state vector notation. The description results in a six-dimensional state vector and involves three lead variables (course of the road, velocity of the lead car and the stimulus of the additional task) and one disturbance variable (side-wind gusts or road irregularities). The routines calculate future values for the course of the road and the velocity of the lead car in order to make anticipation possible by the driver. Driver's actions are modeled by the position of the accelerator, the brake force and the steering wheel angle. Several routines are extended with additional procedures to allow for an independent use in other applications. For example, the mathematical representation of the vehicle dynamics is extended with nonlinear equations to cover the complete range of variables and can be used in specific studies of the effects of vehicle parameters. Author (ESA)

**N82-12776#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### CYBERNETICS AND CAR DRIVING: A DRIVER MODEL AND ITS EXPERIMENTAL VALIDATION

G. J. Blaauw 1980 15 p refs
(IZF-1980-13; TDCK-75012) Avail: NTIS HC A02/MF A01

A linearized mathematical model which describes and predicts driver behavior is introduced. The internal representation consists of an estimation of the state vector describing the system to be controlled. The supervisory structure of the driver is studied by considering lateral and longitudinal control, combined with variations in bandwidth and energy of the lead variables. Car following and course following are included so that driver anticipation can be modeled by the observation of future values of the course of the road and the lead car velocity. A lead variable for the stimulus of an additional task can be included. Model validity is demonstrated by analyzing the effects of variables.

(driving experience, system disturbances, etc.) on the model parameters. Author (ESA)

**N82-12777#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### LEVELS OF STEERING CONTROL: REPRODUCTION OF STEERING WHEEL MOVEMENTS

J. Godthelp 1980 36 p refs
(IZF-1980-16; TDCK-75014) Avail: NTIS HC A03/MF A01

A schematic description of the driving control process using levels of control, i.e., precognitive, pursuit, and compensatory, is presented. The efficiency of the higher levels of control depends on the accuracy of internal information (knowledge of the road, the car, etc.) plus proprioceptive feedback. The sensitivity of the proprioceptive system was analyzed by measuring subjects' accuracy when asked to reproduce steering wheel positions without visual feedback. For discrete positions, standard deviation increases with steering wheel angle amplitude. However, relative errors are greatest with small angles. Steering force reduces the variation in reproduction. For continuous movements, reproductions are less accurate with low movement velocity than for the discrete positions. An additional velocity overshoot occurs. Rapid movements show higher positioning accuracy than slow. Author (ESA)

**N82-12778#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### CYBERNETICS AND CAR DRIVING: PERSPECTIVE PERCEPTION AND THE OUTPUT VECTOR OF THE SYSTEM TO BE CONTROLLED

G. J. Blaauw 1980 22 p refs
(IZF-1980-19; TDCK-75008) Avail: NTIS HC A02/MF A01

A sensitivity analysis for the perspective perception of lateral position variations during course following and distance variations during car following is covered. Variations in the curvature of the road followed are also considered via a perspective transformation. The sensitivities are derived for the development of a cybernetical model to describe and predict driver behavior quantitatively. The curvature variations are related to the most substantial element of the lead vector. The sensitivity for lateral position variations distinguishes between guidance features (lane markers, postmounted delineators, public lighting, etc.). The sensitivities for distance variations are related to the angular perception of the lead car dimensions and the road interval between lead car and own vehicle. The derived transformation equations are combined into one display equation which represents the transformation of the variables involved in the system to be controlled and models the output vector of that system as input information for the driver. Author (ESA)

**N82-12779#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

### THE EFFICIENCY OF DETECTING TRIBAR PATTERNS MODULATED IN RANDOM DOT DENSITY

R. T. Flaherty (Night Vision and Electro-Optics Labs.) and A. VanMeeteren 1980 15 p refs
(IZF-1980-25; TDCK-75020) Avail: NTIS HC A02/MF A01

The ability of the visual system to resolve detail, and to integrate information over area in threshold measurements with tribar targets is examined. Frequency-of-seeing curves were measured for the detection of tribar patterns modulated in the density of computer generated random dot distributions. Comparison of actual and ideal results shows that the visual system uses only 22% of the available information in detecting tribar targets. For long presentation times of 1 sec no difference in efficiency is found for targets of 1 deg X 1 deg and 10 deg X 10 deg. However, for short presentation times of 0.2 sec, the efficiency is about 40% lower for the 10 deg targets. This suggests that the field of view for pattern integration in one glimpse is smaller than 10 deg X 10 deg. Contrast sensitivity functions measured with tribar targets comprise a component for spatial integration inversely proportional to spatial frequency. Author (ESA)

**N82-12780#** Departement d'Etudes et de Recherches en Technologie Spatiale, Toulouse (France). Inst. fuer Flugmechanik.

### REVIEW OF HUMAN AND OPERATIONAL FACTORS AFFECTING THE FEASIBILITY OF THE SEE-AND-AVOID CONCEPT

Otto Weber May 1981 82 p refs
(DFVLR-Mitt-81-13) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 12,30

Theoretical analysis and flight test assessements of the see-and-avoid concept of accident prevention are discussed. The international definition of visibility is supplemented by maximum detection range (MDR) and horizontal standard visibility (HSV). The MDR is always significantly lower than the HSV. Representations from design eye reference points show that cockpit visibility is often poor, especially for light, and small jet, aircraft when flying a horizontal turn. The introduction of speed dependent visual flight regulations is recommended. Author (ESA)

**N82-12781** Pennsylvania State Univ., University Park.

### CLOSE-RANGE CINE-PHOTOGRAMMETRY: A GENERALIZED TECHNIQUE FOR QUANTIFYING GROSS HUMAN MOTION Ph.D. Thesis

James Stephen Walton 1981 648 p
Avail: Univ. Microfilms Order No. 8120471

New cinematographic techniques for performing two and three dimensional analyses are described. Transformations between object coordinates and image coordinates were developed. The techniques are similar to those employed in analytical photogrammetry. Applications of the generalized three dimensional technique require information from a minimum of two distinct views. Applications of the generalized planar technique can e made using information from a single camera. A refined version of the generalized three dimensional technique is also described. This corrects for lens distortions and linear film deformations. It is shown that, using object distances of approximately 35 feet, the center of a golf ball can be located to within .1 inch of its true, three dimensional location. The acceleration of the center of mass of a spinning, yet freely falling trampolinist is determined and compared with the acceleration due to gravity. Dissert. Abstr.

**N82-12782*#** Ohio State Univ., Columbus.

### AN INVESTIGATION INTO PILOT AND SYSTEM RESPONSE TO CRITICAL IN-FLIGHT EVENTS. VOLUME 1: EXECUTIVE SUMMARY Final Report

Thomas H. Rockwell and Walter C. Griffin [1981] 199 p refs
(Contracts NAS2-10047; NAG2-75)
(NASA-CR-164993) Avail: NTIS HC A09/MF A01 CSCL 05H

Critical in-flight events (CIFE) that threaten the aircraft were studied. The scope of the CIFE was described and defined with emphasis on characterizing event development, detection and assessment; pilot information requirements, sources, acquisition, and interpretation, pilot response options, decision processed, and decision implemetation and event outcome. Detailed scenarios were developed for use in simulators and paper and pencil testing for developing relationships between pilot performance and background information as well as for an analysis of pilot reaction decision and feedback processes. Statistical relationships among pilot characteristics and observed responses to CIFE's were developed. R.J.F.

**N82-12783*#** Ohio State Univ., Columbus.

### AN INVESTIGATION INTO PILOT AND SYSTEM RESPONSE TO CRITICAL IN-FLIGHT EVENTS. VOLUME 2: APPENDIX

Thomas H. Rockwell and Walter C. Griffin [1981] 150 p refs
(Contracts NAS2-10047; NAG2-75)
(NASA-CR-164994) Avail: NTIS HC A07/MF A01 CSCL 05H

Materials relating to the study of pilot and system response to critical in-flight events (CIFE) are given. An annotated bibliography and a trip summary outline are presented, as are knowledge surveys with accompanying answer keys. Performance profiles of pilots and performance data from the simulations of CIFE's are given. The paper and pencil testing materials are reproduced. Conditions for the use of the additive model are discussed. A master summary of data for the destination diversion scenario is given. An interview with an aircraft mechanic demonstrates the feasibility of system problem diagnosis from a verbal description of symptoms and shows the information seeking and problem solving logic used by an expert to narrow the list of probable causes of aircraft failure. R.J.F.

**N82-12784#** Naval Air Development Center, Warminster, Pa.

### ANTI-EXPOSURE TECHNOLOGY IDENTIFICATION FOR

**MISSION SPECIFIC OPERATIONAL REQUIREMENTS Final Report**
Suzanne M. Reeps, David C. Johanson, and Louis J. SantaMaria
8 Aug. 1981 113 p refs
(AD-A105070; NADC-81081-60) Avail: NTIS HC A06/MF A01 CSCL 06/17

A selected group of anti-exposure garment configurations have been evaluated at the Naval Air Development Center to determine their comparative levels of performance in the areas of mobility/reach, heat stress/comfort, and immersion hypothermia protection. The specific results of these evaluations are reported, as well as a discussion of how the results relate to the U.S. Navy Operational Requirements for cold water exposure protection, as currently specified by the CNO. GRA

**N82-12785#** ILC Industries, Inc., Dover, Del. Protective Equipment Div.
**ZIPPER REAR CLOSURE ENDURANCE TESTING Final Report, 14 Apr. - 14 Jul. 1981**
Charles R. Sandy 14 Jul. 1981 6 p refs
(Contract DAAK11-79-C-0066)
(AD-A104732) Avail: NTIS HC A02/MF A01 CSCL 06/17

A manned endurance test program of 22 two hr. tests was conducted to verify the reliability of the DPE Outergarment Zipper Rear Closure developed under task order nine of this contract. Testing indicates that the closure assembly reliably provides a positive seal in the rear of the Outergarment as it is actually worn and used. Author (GRA)

**N82-12786#** Systems Technology, Inc., Hawthorne, Calif.
**USER'S GUIDE TO BIODYN-80: AN INTERACTIVE SOFTWARE PACKAGE FOR MODELING BIODYNAMIC FEEDTHROUGH TO A PILOT'S HANDS, HEAD AND EYES Final Report, Jan. 1979 - Oct. 1980**
Susan A. Riedel, Raymond E. Magdaleno, and Henry R. Jex
Jul. 1981 70 p refs
(Contract F33615-79-C-0519; AF Proj. 2312)
(AD-A104933; STI-TR-1146-1) Avail: NTIS HC A04/MF A01 CSCL 06/6

An interactive computer program (BIODYN-80) for solving the dynamic motion response of seated aircrew (pilots or equipment operators) working in a biodynamic environment (such as vibration or changing levels of acceleration in aircraft, surface vehicles, or motion simulators) is described. The multi-degree-of-freedom, lumped-parameter model includes elements for: pelvis, torso, neck, head, eyes, upper and lower arms, hand-grip and control stick (center-stick with arm rest). The nonlinear equations of motion of the body's main elements are linearized about a general set of body-limb-head postures, ranging from prone, to erect, to supine. Typical parameter ranges and sources are given, along with two 'typical' sets: a seated-pilot with center-stick, and a seated produce biomechanical transmissability files needed for use in the Air Force's PIVIB program for tracking performance estimation. Procedures and examples are given for both a Cyber 175 version and a PDP-10 version. GRA

**N82-12787#** Nederlands Inst. voor Praeventieve Gezondheidszorg TNO, Leiden.
**HUMAN CONTROL AND REGULATION TASKS [MENSELIJKE STUUR-EN REGELTAKEN]**
C. L. Ekkers, A. A. F. Brouwers, C. K. Pasmooij, and P. M. deVlaming Delft Netherlands Organization for Applied Scientific Research TNO Sep. 1980 246 p refs In DUTCH
Avail: NTIS HC A11/MF A01

The effects of technological development, defined as automation, on the nature and quality of human work in industrial process control systems and computer systems were investigated. Twenty four man machine systems with different degrees of automation and complexity were compared for characteristics of technical, organizational and individual tasks. It is noted that sharing of tasks between man and machine is more unfavorable at higher levels of automation. The operator's abilities are only occasionally utilized and the opportunity to do meaningful work is limited. Teamwork is more positive, but it llimits the individual operator's autonomy, even more in highly automated systems. In administrative computer systems, the routine nature of the work and its rigid procedures are considered negative. A clear correlation is found between these problems, job satisfaction and sickness rate. Author (ESA)

**N82-12788#** Engins Matra, Velizy (France).
**METHODICAL STUDY OF THE CONTRIBUTION OF THE HUMAN SYSTEM TO THE INSECURITY OF TECHNOLOGICAL SYSTEMS [ETUDE METHODIQUE DE LA CONTRIBUTION DU SYSTEM HUMAIN A L'INSECURITE DES SYSTEMES TECHNOLOGIQUES]**
J. L. Deschamps 1981 18 p In FRENCH
Avail: NTIS HC A02/MF A01

The use of probability studies to increase system safety is advocated. The danger of overlooking human error when attributing blame for the failure of a piece of equipment is emphasized. The links between professional competence and physical and mental health are pointed out. It is recommended that serious accidents should be analyzed in terms of: the industry (petrochemical, construction, etc.); production unit (number of employees, foremen, etc.); job description; trades of persons involved; individual characteristics of persons involved (age, education, etc.); and the scenario (time, place, etc.).
Author (ESA)

**N82-12789#** Joint Publications Research Service, Arlington, Va.
**CHINA REPORT: SCIENCE AND TECHNOLOGY, NO. 128**
23 Sep. 1981 49 p Transl. into ENGLISH from various Chinese articles
(JPRS-79047) Avail: NTIS HC A03/MF A01

The state of the art in science and technology in the Chinese Peoples Republic is reported. Abstracts dealing with the following topics are presented: (1) applied sciences; (2) publications; (3) civil engineering; (4) electronics; (5) geography; (6) internal combustion engine engineering; (7) nuclear physics; (8) petroleum science; (9) solar energy; and (10) transportation modernization. For individual titles, see N82-12790 through N82-12790.

**N82-12790#** Joint Publications Research Service, Arlington, Va.
**EQUIPMENT DESIGN MUST INCORPORATE EASE OF OPERATION**
Xiong Jiayu *In its* China Rept.: Sci. and Technol., No. 128 (JPRS-79047) 23 Sep. 1981 p 1-6 Transl. into ENGLISH from Gongcheng Jixie (Tianjin), no. 6, 1981 p 30-33

Avail: NTIS HC A03/MF A01

Essential factors in the design of construction machines and equipment are: (1) height of operating installation; (2) vision; (3) hearing; and (4) force required for operation. Topics discussed include adaptation to brightness and darkness, color discrimination, auditory threshold, exercise physiology, reaction time and dexterity. E.A.K.

**N82-13058#** Naval Air Development Center, Warminster, Pa.
**THE INTELLIGENT USE OF INTELLIGENT SYSTEMS: PROBLEMS IN ENGINEERING MAN/MACHINE SYMBIOSIS**
J. Hopson, W. Zachary (Analytics, Inc., Willow Grove, Pa.), and N. Lane *In* AGARD The Impact of New Guidance and Control Systems on Mil. Aircraft Cockpit Design Aug. 1981 16 p refs
Avail: NTIS HC A10/MF A01

A methodology to structure the process of designing 'intelligent systems' was generated in the course of several specific projects undertaken to develop such systems for a variety of airborne platforms. The general goals of these projects are to improve system performance by enhancing the effectiveness of information management within the total avionics systems. Results from the studies are summarized and the knowledge gained is related to a systematic design/evaluation approach. A.R.H.

**N82-13062#** Naval Air Test Center, Patuxent River, Md.
**EVALUATION OF A PILOT WORKLOAD ASSESSMENT DEVICE TO TEST ALTERNATE DISPLAY FORMATS AND CONTROL HANDLING QUALITIES**
Samuel G. Schiflett, Paul M. Linton (Naval Air Development Center, Warminster, Pa.), and Ronald J. Spicuzza (Systems Research Labs., Inc., Dayton, Ohio) *In* AGARD The Impact of New Guidance and Control Systems on Mil. Aircraft Cockpit Design Aug. 1981 12 p refs

Avail: NTIS HC A10/MF A01

The utility of a workload assessment device to measure pilot workload for approach and landing formats and control stability variations was tested in in a modified NT-33 research aircraft.

The feasibility of using an item-recognition task as a measure of sensory-response loading and reserve information processing capacity while flying precision approaches was established. Statistical treatment of the data indicates an appreciable increase in reaction time and errors with degraded handling qualities as compared to ground baseline measures and good handling qualities. The preliminary findings also reveal consistent trends toward the availability of more mental reserve capacity when flying predominantly pictorial/symbolic HUD configurations as compared to conventional HUD formats with scales and alphanumerics. A.R.H.

**N82-13646** Kansas State Univ., Manhattan.
**ANALYTICAL DETECTION OF ORGANIC SPECIES BY MEANS OF LASER-INDUCED MULTIPHOTON IONIZATION Ph.D. Thesis**
Richard Kenneth Simon, Jr. 1980 189 p
Avail: Univ. Microfilms Order No. 8122036

Multiphoton ionization (MP) is spectrometric technique which was developed for the the analysis of trace amounts of both atomic and molecules species. The methods is based on two or more photons being absorbed by the the analyte which results in the analyte being ionized. The intense photoexcitation of the analysis is achieved by focussing the output of a pulsed tunable dye laser in an ionization chamber. The ionization chamber serves as the analyte reservoir and allows detection of the resulting MP1 current pulse. The non-optical nature of the signal detection makes MP1 a novelspectroscopic technique: no optical collection, dispersion, and/or detection is required; scattered and stray light are irrelevant; vacuum ultraviolet spectroscopy in air possible without special optics. Dissert. Abstr.

**N82-13647#** Calspan Advanced Technology Center, Buffalo, N.Y.
**MITIGATION OF BIOFOULING USING COATINGS Quarterly Progress Report**
A. E. Meyer and R. W. King 22 Jun. 1981 13 p refs
(Contract DE-AC02-80ER-10766)
(DE81-027900; DOE/ER-10766/3: QPR-3) Avail: NTIS HC A02/MF A01

Progress is reported in a project in which the objectives are to evaluate benefits associated with control of the surface energetic properties of materials used in heat exchangers, and to identify preferred ranges of these surface conditions that minimize deposits of biological fouling known to deteriorate heat exchange efficiencis in seawater, brackish water and freshwater systems. The technical approach employed uses special diagnostic plates in novel flow cells where fluid flow conditions can be well-controlled, modifying the surface chemistry and surface energy of the plates with very thin coatings and examining the earliest events of biofouling caused by macromolecules and microbial organisms. Information is included on exposure experiments and results and heat exchange experiments. DOE

**N82-13648** Stanford Univ., Calif.
**SUPERCONDUCTING MAGNETOMETRY FOR CARDIOVASCULAR STUDIES AND AN APPLICATION OF ADAPTIVE FILTERING Ph.D. Thesis**
Mark Curtis Leifer 1981 174 p
Avail: Univ. Microfilms Order No. 8124101

Sensitive magnetic detectors utilizing Superconducting Quantum interference Devices, studying the cardiovascular system were developed. The theory of magnetic detection of cardiac currents is discussed, and experimental data supporting the validity of the theory is presented. Measurements on both humans and dogs, in both healthy and diseased states, are presented using the technique, which is termed vector magnetocardiography. Performance of the actual device displays significantly improved sensitivity in this frequency range, and the ability to measure currents in intact, in vivo biological fibers. The theoretical operation of a digital self-optimizing filter is reviewed and a four-channel software implementation of the system is presented. The application of the adaptive filter to enhancement of geomagnetic signals for earthquake forecasting is discussed, and the adaptive filter is shown to outperform existing techniques in suppressing noise from geomagnetic records. Dissert. Abstr.

**N82-13649#** Armed Forces Radiobiology Research Inst., Bethesda, Md.
**NEUROTRANSMITTER FUNCTION IN THE BASAL GANGLIA AFTER ACUTE AND CHRONIC ETHANOL TREATMENT**
Walter A. Hunt Jul. 1981 10 p refs
(AD-A103744; AFRRI-SR81-19) Avail: NTIS HC A02/MF A01 CSCL 06/15

Acute and chronic administration of ethanol has multiple effects on several neurotransmitters in the basal ganglia. Dopamine is the transmitter predominantly affected. Acceleration of dopaminergic activity is observed at low doses of ethanol. However, at high doses the reverse is observed. During the ethanol withdrawal syndrome that develops after chronic treatment, dopaminergic responses are reduced, whether from presynaptic or postsynaptic origins. Ethanol induces a variety of alterations in neurotransmitter function as a result of its disruption of membrane structure and associated electrical properties. GRA

**N82-13650#** Naval Biodynamics Lab., New Orleans, La.
**DETERMINATION OF EFFICIENT METHODS OF LIFT BY COMPARING TRAINED AND UNTRAINED MALE AND FEMALE LIFTERS Final Report**
Richard H. Shannon 3 Dec. 1980 141 p refs
(AD-A100349; NBDL-M004) Avail: NTIS HC A07/MF A01 CSCL 06/14

The effects of sex and training variables during nonrepetitive, short duration lifts in the sagittal plane were analyzed. One half of each sex subsample was part of a lifting training program, while the other half was used as a control group. The effects of body movements by these subjects in the height ranges from the floor to the knuckle and the knuckle to the shoulder were ascertained with 10, 25, 40 pound weight loads. Muscular strain, stroboscopic photography to calculate differences in displacement time vectors, and the force platform to specify force changes at the feet were determined. The various statistical techniques applied were: factor analysis, regression analysis, analysis of variance, t-test and nonparametric statistics. The results are a five factor biomechanical model, regression equations predicting inertial forces at the hands, and significant differences between the untrained and trained conditions, and males and females. It is concluded that manual handling training programs are necessary in the work environment if women are expected to lift loads of approximately 40 pounds. Author

**N82-13651#** Australian Radiation Lab., Melbourne.
**ABSORBED DOSE TO ACTIVE RED BONE MARROW FROM DIAGNOSTIC AND THERAPEUTIC USES OF RADIATION**
S. B. Solomon and N. D. Morris Jun. 1980 34 p refs
(ARL-TR-021; ISSN-0157-1400) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The method of calculation of the radiation doses to the active bone marrow from diagnostic radiography, fluorescopy and radiotherapy is described. The bone marrow dose arising from radiological procedures Australia was determined as part of a survey of population doses. The results of the calculations [illegible]ompared with the results of other models of bone marrow [illegible] for a number of diagnostic X-ray procedures. DOE

**N82-13652#** Oak Ridge National Lab., Tenn.
**HEALTH AND SAFETY RESEARCH DIVISION Progress Report, 1 Oct. 1979 - 31 Mar. 1981**
Aug. 1981 109 p refs
(Contract W-7405-eng-26)
(DE81-026088; ORNL-5750) Avail: NTIS HC A06/MF A01

Progress in health and safety research is reported. A summary of the major fields covered includes: basic research in physical sciences, life sciences research and assessment, and multidisciplinary studies on the impact of alternative energy technology and policy options. E.A.K.

**N82-13653#** Ingenieurbuero fuer Ergonomie, Munich (West Germany).
**INFLUENCE OF SINE, AND RANDOM, WHOLE-BODY VIBRATION ON VISUAL ACUITY [EINFLUSS SINUSFOERMIGER UND REGELLOSER GANZKOERPERSCHWINGUNGEN AUF DIE VISUELLE INFORMATIONSAUFNAHME]**
Norbert May Bonn Bundesministerium der Verteidigung 1979 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium der Verteidigung
(BMVg-FBWT-79-17) Avail: NTIS HC A06/MF A01; DOKZENTBw, Bonn DM 30

The far, visual acuity of people subjected to vertical whole-body vibration (different vibration types and loads) was tested. A total of 110 subjects of both sexes, either exposed to sine vibration in the range from 2 to 18 cycles/sec or to random vibrations in the same frequency range, participated. The rms accelerations on the heads of subjects were 0.17, 0.2 and 0.43 m/sec squared. The subjects sat erect on an uncushioned seat, mounted on a hydromechanical vibration apparatus. Results show that relative visual acuity diminishes with sine vibrations while increasing frequency and/or accelerations (from 6% minimum to 37.5 % maximum of visual acuity under static conditions). With random vibrations there is also an acuity decrease although smaller, while increasing the vibration frequency as well as with increasing acceleration load. Author (ESA)

**N82-13654#** Freie Univ., Berlin (West Germany). Physiologisches Inst.

**THE MEASUREMENTS OF FLUID SHIFTS AND OF THE TISSUE COMPLIANCE ALONG BODY AXIS IN MAN Final Report**

Karl Kirsch Bonn Bundesministerium fuer Forschung und Technologie Sep. 1980 41 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-80-011; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,60

Tissue volume changes on different parts of the body were simultaneously measured by ultrasonic techniques in order to monitor the shift of fluid volumes along the body axis. Once fully established, the method could be used for measuring the shift of blood and interstitial fluid from the lower to the cephalic part of the body, occurring under zero-gravity conditions. Proof of principle tests were carried out under orthostatis, immersion and heat exposure conditions were confirmed by post mortem comparisons. By mounting the measuring probe in an airtight chamber, the tissue complience C = dV/dP was also determined. The results found are consistent with previous investigations and with clinical tests. Application in space and as a circulation diagnostic method is advocated. Author (ESA)

**N82-13655#** Environmental Protection Agency, Washington, D.C. Dept. of Biology.

**METABOLISM SUMMARIES OF SELECTED HALOGENATED ORGANIC COMPOUNDS IN HUMAN AND ENVIRONMENTAL MEDIA, A LITERATURE SURVEY: FIRST UPDATE Final Report**

Syed M. Naqvi and Marion C. Blois Dec. 1980 44 p refs
(PB81-232811; EPA-560/13-79-018) Avail: NTIS HC A03/MF A01 CSCL 06T

Metabolism summaries as well as basic information on the physical properties of 19 halocarbons are presented. Molecular and structural formulas, the Chemical Astracts Registry number, accepted synomyns, molecular weight, boiling point, and vapor pressure are included. Information on the uptake and retention of the compound, its subsequent distribution and elimination patterns, the identification and observed concentrations of metabolites, and the metabolic pathways involved is provided. S.L.

**N82-13656** California Univ., Los Angeles.

**A MONITOR FOR NONINVASIVE ESTIMATION OF PULMONARY BLOOD FLOW Ph.D. Thesis**

Luigi Arena 1981 224 p
Avail: Univ. Microfilms Order No. 8122798

The design and the evaluation of a digital based monitoring device implementing a technique for the noninvasive estimation of pulmonary perfusion are described. This technique proved reliable in preliminary off-line experiments, however many engineering questions must be resolved before this principle can be transformed into a clinically useful device. Three main aspects of this study were identified model simulation, development and test of the instrumentation and clinical experiments. Dissert. Abstr.

**N82-13657** Northeastern Univ., Boston, Mass.

**LINGUISTIC AND HUMAN PERFORMANCE CONSIDERATIONS IN THE DESIGN OF AN ANTICIPATORY COMMUNICATION AID Ph.D. Thesis**

Clinton David Gibler 1981 365 p
Avail: Univ. Microfilms Order No. 8124891

A communication aid is a device that assists a disabled person with the generation of messages. A scanning aid presents language elements (e.g.) letters, words) in a sequential fashion to accommodate those whose disability does not permit the direct selection of language elements. Anticipatory methods utilize statistical characteristics of language to shorten the average sequential access time to each language element. The study is restricted to those aids having the capacity for English text generation. The research yielded two developments: a small, general purpose dictionary that accounts for a high percentage of a person's vocabulary; and a human performance model that accurately predicts communication rates for the transcription task, given basic human performance data about the user. Dissert. Abstr.

**N82-13658** Stanford Univ., Calif.

**A SYSTEMS ANALYSIS OF THE MATURATION OF SLEEP USING A SEMI-MARKOV MODEL Ph.D. Thesis**

Thomas Raymond Bowe 1981 122 p
Avail: Univ. Microfilms Order No. 8124040

An approach to analyze the sleep process in human infants is presented. In particular it formulates phase varying semi-Markov models for infants at 2, 4, 8, 20, 24, 36, and 52 weeks of age. The Bayesian estimation procedure employed allows the uncertainty in the estimated parameters to be quantitized. The parameters of the models represent the basic building blocks of the sleep process and can be used to predict any statistic of interest. The models were used to investigate the rhythmic nature of the sleep process. The concept that sleep develops a periodic tendency was mathematically investigated and defined. Dissert. Abstr.

**N82-13659** Syracuse Univ., N. Y.

**DEPOSITION OF AEROSOL PARTICLES IN THE HUMAN RESPIRATORY TRACT Ph.D. Thesis**

Shii-Pyng Shiah 1981 192 p
Avail: Univ. Microfilms Order No. 8123939

The dispersion and deposition of aerosol particles in human lungs are investigated. The development of a three dimensional airway model, the dispersion of half micrometer particles in the respiratory tract, and deposition of aerosol particles in the respiratory tract are studied. A model of the upper tracheobronchial tree is constructed to account for the three dimensional nature of the airway system. A mathematical model is developed for predicting the percentage of inhaled hygrocopic particles which deposit in each generation of the repeatedly bifurcating tubes in an airway tree. A theoretical model of aerosol dispersion in the human lungs is extended to the alveolated regions by considering the expansion and contraction of the alveoli. The percentage of inhaled paticles which deposit in each generation of tubes is calculated for all generations reached by the inhaled aerosols. Dissert. Abstr.

**N82-13660** Northwestern Univ., Evanston, Ill.

**DYNAMIC MEASUREMENT OF HUMAN VERTICAL FUSIONAL RESPONSE Ph.D. Thesis**

Arye Lipa Perlmutter 1981 88 p
Avail: Univ. Microfilms Order No. 8124975

The response was studied in order to explore the relationship between its sensory and motor components. Two SRI Double Purkinje Image Eyetrackers were used for binocular recordings of eye movements in response to the presentations of vertical disparities. The binocular coordination of vertical fusional responses were studied through the presentations of asymmetrical disparities as well as predictable and unpredictable symmetrical sinusoidal disparities. The motor response to asymmetrical disparity presentation is found to be incomplete, thus allowing for the existence of a significant sensory component. When ramp disparities were presented only the eye whose monocular image moved followed the stimulus closely while the other eye did not move or moved by a small amount. Dissert. Abstr.

**N82-13661** Stanford Univ., Calif.

**ALGORITHMS FOR IMAGING MYOCARDIAL BLOOD FLOW USING X-RAY COMPUTED TOMOGRAPHY Ph.D. Thesis**

Menahem Nassi-F 1981 136 p
Avail: Univ. Microfilms Order No. 8124117

Algorithms are proposed to remove degradation of contrast and spatial resolution produced by the motion of the heart in X-ray computed tomography. A mathematical model is derived for regional myocardial blood flow (RMBF) estimation which uses a classical, deterministic formulation to describe tracer dynamics in the myocardium. Based upon the perfect mixing assumption, this theory removes the requirement for intra-arterial bolus injection of tracer (diatrizoate radiographic contrast). Regional partition coefficients are estimated, which render absolute RMBF estimates [ml/(min x gr)]. The requirement for curve extrapolation (zeroth and first moment computation) in the presence of recirculation, and the considerable measurement noise which is unaccounted for, are both removed by the proposed alternative stochastic formulation. Dissert. Abstr.

**N82-13662*#** Ohio State Univ., Columbus. Dept. of Industrial and Systems Engineering.
**AN INVESTIGATION INTO PILOT AND SYSTEM RESPONSE TO CRITICAL IN-FLIGHT EVENTS, VOLUME 1 Final Report, 27 Oct. 1978 - 26 Jun. 1981**
Thomas H. Rockwell and Walter C. Giffin Jun. 1981 200 p refs 2 Vol.
(Contract NAS2-10047; Grant NAG2-75; RF Proj. 761415/711621; RF Proj. 762501/713447)
(NASA-CR-166243-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 05H

The scope of a critical in-flight event (CIFE) with emphasis on pilot management of available resources is described. Detailed scenarios for both full mission simulation and written testing of pilot responses to CIFE's, and statistical relationships among pilot characterictics and observed responses are developed. A model developed to described pilot response to CIFE and an analysis of professional fight crews compliance with specified operating procedures and the relationships with in-flight errors are included. S.L.

**N82-13663*#** Ohio State Univ., Columbus. Dept. of Industrial and Systems Engineering.
**AN INVESTIGATION INTO PILOT AND SYSTEM RESPONSE TO CRITICAL IN-FLIGHT EVENTS, VOLUME 2 Final Report, 27 Oct. 1978 - 26 Jun. 1981**
Thomas H. Rockwell and Walter C. Giffin Jun. 1981 151 p 2 Vol.
(Contract NAS2-10047; Grant NAG2-75; RF Proj. 761415/711621; RF Proj. 762501/713447)
(NASA-CR-166243-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 05H

Critical in-flight event is studied using mission simulation and written tests of pilot responses. Materials and procedures used in knowledge tests, written tests, and mission simulations are included. S.L.

**N82-13664*#** Computer Sciences Corp., Mountain View, Calif.
**VISUAL/MOTION CUE MISMATCH IN A COORDINATED ROLL MANEUVER**
Douglas K. Shirachi and Richard S. Shirley May 1981 51 p
(Contract NAS2-9741)
(NASA-CR-166259; CSCR-8) Avail: NTIS HC A04/MF A01 CSCL 05H

The effects of bandwidth differences between visual and motion cueing systems on pilot performance for a coordinated roll task were investigated. Visual and motion cue configurations which were acceptable and the effects of reduced motion cue scaling on pilot performance were studied to determine the scale reduction threshold for which pilot performance was significantly different from full scale pilot performance. It is concluded that: (1) the presence or absence of high frequency error information in the visual and/or motion display systems significantly affects pilot performance; and (2) the attenuation of motion scaling while maintaining other display dynamic characteristics constant, affects pilot performance. E.A.K.

**N82-13665*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**PROCEEDINGS OF THE SEVENTEENTH ANNUAL CONFERENCE ON MANUAL CONTROL**
15 Oct. 1981 693 p refs Conf. held in Los Angeles, 16-18 Jun. 1981; sponsored by NASA and ONR
(Contract NAS7-100)
(NASA-CR-165006; JPL-Pub-81-95) Avail: NTIS HC A99/MF A01 CSCL 05H

Manual control is considered, with concentration on perceptive/cognitive man-machine interaction and interface.

**N82-13666*#** California Univ., Los Angeles. Brain Research Inst.
**PUPILLOMETRIC MEASUREMENT OF OPERATOR WORKLOAD**
Jackson Beatty *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 1-6 refs

(Contract N00014-76-C-0616)
Avail: NTIS HC A99/MF A01 CSCL 05/4

Pupillometry as a method of measuring workload is described. Pupillometric measures provide an indication of momentary fluctuations in central nervous system excitability that occur as cognitive operations are performed; the magnitude of these changes may serve as a sensitive indicator of the workload imposed by cognitive tasks. J.D.H.

**N82-13667*#** Illinois Univ., Champaign. Dept. of Psychology.
**THE COGNITIVE DEMANDS OF SECOND ORDER MANUAL CONTROL: APPLICATIONS OF THE EVENT RELATED BRAIN POTENTIAL**
Christophor Wickens, Richard Gill, Arthur Kramer, William Ross, and Emanuel Donchin *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 7-16 refs

(Contract F49620-79-C-0233)
Avail: NTIS HC A99/MF A01 CSCL 05H

Three experiments are described in which tracking difficulty is varied in the presence of a covert tone discrimination task. Event related brain potentials (ERPs) elicited by the tones are employed as an index of the resource demands of tracking. The ERP measure reflected the control order variation, and this variable was thereby assumed to compete for perceptual/central processing resources. A fine-grained analysis of the results suggested that the primary demands of second order tracking involve the central processing operations of maintaining a more complex internal model of the dynamic system, rather than the perceptual demands of higher derivative perception. Experiment 3 varied tracking bandwidth in random input tracking, and the ERP was unaffected. Bandwidth was then inferred to compete for response-related processing resources that are independent of the ERP. J.D.H.

**N82-13668*#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**A STUDY ON TASK DIFFICULTY AND ACCELERATION STRESS**
D. W. Repperger and D. B. Rogers *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 17-31 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The results of two experiments which relate to task difficulty and the effects of environmental stress on tracking performance are discussed and compared to subjective evaluations. The first experiment involved five different sum of sine tracking tasks which humans tracked both in a static condition and under a 5 Gz acceleration stress condition. The second experiment involved similar environmental stress conditions but in this case the tasks were constructed from deterministic functions with specially designed velocity and acceleration profiles. Phase Plane performance analysis was conducted to study potential measures of workload or tracking difficulty. J.D.H.

**N82-13669*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**SUBJECTIVE RATING SCALES AS A WORKLOAD**
Kathleen L. Bird (Virginia Polytechnic Inst. and State Univ.) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 33-39 refs

(Contract NAG1-217)
Avail: NTIS HC A99/MF A01 CSCL 05H

A multidimensional bipolar-adjective rating scale is employed as a subjective measure of operator workload in the performance of a one-axis tracking task. The rating scale addressed several dimensions of workload, including cognitive, physical, and perceptual task loading as well as fatigue and stress effects. Eight subjects performed a one-axis tracking task (with six levels of difficulty) and rated these tasks on several workload dimensions. Performance measures were tracking error RMS (root-mean square) and the standard deviation of control stick output. Significant relationships were observed between these performance measures and skill required, task complexity, attention level, task difficulty, task demands, and stress level. Author

**N82-13670*#** California Univ., Los Angeles.
**PHYSIOLOGICAL ASSESSMENT OF OPERATOR WORKLOAD DURING MANUAL TRACKING. 1: PUPILLARY RESPONSES**
Quiyan Jiang, Raja Parasuraman, and Jackson Beatty *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 41-48 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

The feasibility of pupillometry as an indicator for assessing operator workload during manual tracking was studied. The mean and maximum pupillary responses of 12 subjects performing tracking tasks with three levels of difficulty (bandwidth of the forcing function were 0.15, 0.30 and 0.50 Hz respectively) were analysed. The results showed that pupillary dilation increased significantly as a function of the tracking difficulty which was reflected by the significant increase of tracking error (RMS). The present study supplies additional evidence that pupillary response is a sensitive and reliable index which may serve as an indicator for assessing operator workload in man-machine systems. Author

**N82-13671*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**HORIZONTAL CONFLICT RESOLUTION MANEUVERS WITH A COCKPIT DISPLAY OF TRAFFIC INFORMATION**
Evertt Palmer, Sharon Jago, and Myrna DuBord *In* JPL Proc. of the 17th Ann. Conf. on Manual control 15 Oct. 1981 p 51-62 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

Pilot resolution of potential conflicts in the horizontal plane when the only information available on the other aircraft was presented on a Cockpit Display of Traffic Information (CDTI) is investigated. The pilot's task was to assess the situation and if necessary maneuver so as to avoid the other aircraft. No instructions were given on evasive strategy or on what was considered to be an acceptable minimum separation. The results indicate that pilots had a strong bias of turning toward the intruder aircraft in order to pass behind it. In more than 50% of the encounters with a 90 degree crossing angle in which the intruder aircraft was programmed to pass behind the aircraft, the pilots maneuvered so as to pass behind the intruder. This bias was not as strong with the display which showed a prediction of the intruder's relative velocity. The average miss distance for all encounters was about 4500 feet. J.D.H.

**N82-13672*#** Grumman Aerospace Corp., Bethpage, N.Y.
**SOME EFFECTS OF FIELD OF VIEW (FOV) AND TARGET SIZE ON LATERAL TRACKING AT HOVER**
Henry T. Breul *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 63-75 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

An exploratory flight-simulator experiment examined the gross effects of several factors potentially important to the design of a visual display system for aiding VTOL pilots in the difficult task of landing on a small sea-control ship. Field of view (FOV) and target size were the primary variables examined for a lateral tracking task in a full motion 5 degree-of-freedom hover simulation. The mean absolute value of tracking error was used to measure tracking performance, and cross spectral transfer function analysis was performed to determine the pilot's ability to generate good open-loop transfer function characteristics as a function of the experimental variables. It was found that FOV and target size can have a large effect on the pilot's ability to generate open-loop gain, and on his tracking performance. J.D.H.

**N82-13673*#** Linkabit Corp., San Diego, Calif.
**VIDEO FRAMERATE, RESOLUTION AND GRAYSCALE TRADEOFFS FOR UNDERSEA TELEMANIPULATOR**
Vivek Ranadive and Thomas B. Sheridan *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 77-88 refs Prepared in cooperation with MIT, Cambridge

Avail: NTIS HC A99/MF A01 CSCL 05H

The product of Frame Rate (F) in frames per second, Resolution (R) in total pixels and grayscale in bits (G) equals the transmission band rate in bits per second. Thus for a fixed channel capacity there are tradeoffs between F, R and G in the actual sampling of the picture for a particular manual control task in the present case remote undersea manipulation. A manipulator was used in the MASTER/SLAVE mode to study these tradeoffs. Images were systematically degraded from 28 frames per second, 128 x 128 pixels and 16 levels (4 bits) grayscale, with various FRG combinations constructed from a real-time digitized (charge-injection) video camera. It was found that frame rate, resolution and grayscale could be independently reduced without preventing the operator from accomplishing his/her task. Threshold points were found beyond which degradation would prevent any successful performance. A general conclusion is that a well trained operator can perform familiar remote manipulator tasks with a considerably degrade picture, down to 50 K bits/ sec. J.D.H.

**N82-13674*#** Technion - Israel Inst. of Tech., Haifa.
**PREDICTOR SYMBOLOGY IN COMPUTER-GENERATED PERSPECTIVE DISPLAYS**
Arthur J. Grunwald *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 89-94 ref

(Contract NASw-3302)
Avail: NTIS HC A99/MF A01 CSCL 05H

An advanced diplay format for the four dimensional commercial aircraft approach-to-landing is evaluated. The desired curved and descending approach path is presented by displaying the perspective image of a tunnel. Attention is focussed on the predictor symbology, superimposed on the tunnel image. A perspective three dimensional predictor symbol, providing future position, as well as future attitude information, is compared with a flat two dimensional version, which only provides the future position. In addition to this, the predictor displays the actual airspeed as well as the desired airspeed, prescribed by the four dimensional path. Results show that the three dimensional predictor symbol outperforms the two dimensional predictor in following the trajectory in a moderate-to-heavy turbulent environment, which is manifested in accurate manual true airspeed control was obtained without affecting the main task performance significantly. Author

**N82-13675*#** New Mexico Univ., Albuquerque. Dept. of Mechanical Engineering.
**SUPERVISORY CONTROL OF REMOTE MANIPULATION: A PRELIMINARY EVALUATION**
Gregory P. Starr *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 95-107 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A system for supervisory control is described, and preliminary results are presented. Supervisory control, where control is traded between man and computer, offers benefits in the control of a remote manipulator. The system has the potential to accomplish sophisticated tasks. It is indicated that supervisory control yields lower task completion times and is preferred over manual control. E.A.K.

**N82-13676*#** California Univ., Los Angeles. Dept. of Engineering Systems.
**RESEARCH ISSUES IN IMPLEMENTING REMOTE PRESENCE IN TELEOPERATOR CONTROL**
Kevin Corker, Andrew H. Mishkin, and John Lyman *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 109-126 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

The concept of remote presence in telomanipulation is presented. A conceptual design of a prototype teleoperator system incorporating remote presence is described. The design is presented in functional terms, sensor, display, and control subsystem. An intermediate environment, in which the human operator is made to feel present, is explicated. The intermediate environment differs from the task environment due to the quantity and type of information presented to an operator and due to scaling factors protecting the operator from the hazards of the task environment. Potential benefits of remote presence systems, both for manipulation and for the study of human cognition and preception are discussed. E.A.K.

**N82-13677*#** Paris XII Univ., Evry (France).
**THE PERSISTENCE OF A VISUAL DOMINANCE EFFECT IN A TELEMANIPULATOR TASK: A COMPARISON BETWEEN VISUAL AND ELECTROTACTILE FEEDBACK**
J. P. Gaillard *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 127-138 refs Sponsored in part by Direction de la Recherche des Equipements Techniques

Avail: NTIS HC A99/MF A01 CSCL 05H

The possibility to use an electrotactile stimulation in teleoperation and to observe the interpretation of such information as a feedback to the operator was investigated. It is proposed that visual feedback is more informative than an electrotactile one; and that complex electrotactile feedback slows down both the motor decision and motor response processes, is processed as an all or nothing signal, and bypasses the receptive structure and accesses directly in a working memory where information is sequentially processed and where memory is limited in treatment capacity. The electrotactile stimulation is used as an alerting signal. It is suggested that the visual dominance effect is the result of the advantage of both a transfer function and a sensory memory register where information is pretreated and memorized for a short time. It is found that dividing attention has an effect on the acquisition of the information but not on the subsequent decision processes. E.A.K.

**N82-13678*#** Oak Ridge National Lab., Tenn. Fuel Recycle Div.

**MAN/MACHINE INTERFACE DEVELOPMENT FOR THE REMOTEX CONCEPT**

J. Garin and M. M. Clarke (Oak Ridge Associated Universities) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 139-144 refs

(Contract W-7405-eng-26)

Avail: NTIS HC A99/MF A01 CSCL 05H

The development of a man/machine interface system that can be used to remotely control a system composed of a transporter base and a force-reflecting, survocontrolled manipulator is reported. The concept features the incorporation of totally remote operation. A simulator is build to optimize man/machine interface requirements. E.A.K.

**N82-13679*#** Oak Ridge Associated Universities, Tenn.

**IDENTIFICATION OF COGNITIVE FACTORS RELATED TO REMOTE WORK PERFORMANCE USING CLOSED CIRCUIT TV DISPLAYS**

M. M. Clarke and J. Garin (ORNL) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 145-148 refs

(Contract W-7405-eng-26)

Avail: NTIS HC A99/MF A01 CSCL 05H

Operator perceptual cognitive styles as predictors of remote task performance were identified. Remote tasks which require the use of servo controlled master/slave manipulators and closed circuit television for teleoperator repair and maintenance of nuclear fuel recycling systems are examined. A useful procedure for identifying such perceptual styles is described. E.A.K.

**N82-13680*#** Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

**SIMPLE GEOMETRIC ALGORITHMS TO AID IN CLEARANCE MANAGEMENT FOR ROBOTIC MECHANISMS**

E. L. Copeland, L. D. Ray, and J. D. Peticolas *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 149-155

Avail: NTIS HC A99/MF A01 CSCL 05H

Global geometric shapes such as lines, planes, circles, spheres, cylinders, and the associated computational algorithms which provide relatively inexpensive estimates of minimum spatial clearance for safe operations were selected. The Space Shuttle, remote manipulator system, and the Power Extension Package are used as an example. Robotic mechanisms operate in quarters limited by external structures and the problem of clearance is often of considerable interest. Safe clearance management is simple and suited to real time calculation, whereas contact prediction requires more precision, sophistication, and computational overhead. E.A.K.

**N82-13681*#** General Motors Research Labs., Warren, Mich. Engineering Mechanics Dept.

**THE INFLUENCE OF MOTION CUES ON DRIVER-VEHICLE PERFORMANCE IN A SIMULATOR**

Brian S. Repa, Philip M. Leucht, and Walter W. Wierwille (Virginia Polytechnic Inst. and State Univ.) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 157-169 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Four different motion base configurations were studied on driving simulator. Differently responding vehicles were simulated on each motion configurations and the effects of the vehicle characteristics on driver vehicle system performance, driver control activity, and driver opinion ratings of vehicle performance during driving are compared for different motion configurations. Data show that: (1)) the effects of changes in vehicle characteristics on the different objective and subjective measures of driver vehicle performance are not disguised by the lack of physical motion; (2) fixed base simulator can be used to draw inferences despite the lack of motion; (3) the presence of motion tends to reduce path keeping errors and driver control activity; (4) roll and yaw motions are recommended because of their marked influence on driver vehicle performance (5) the importance of motion increases as the driving maneuvers become more extreme. E.A.K.

**N82-13682*#** Lockheed-California Co., Burbank.

**MULTIPLE MAN-MACHINE INTERFACES**

Lillian Stanton and Creighton W. Cook *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 171-186 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The multiple man machine interfaces inherent in military pilot training, their social implications, and the issue of possible negative feedback were explored. Modern technology has produced machines which can see, hear, and touch with greater accuracy and precision than human beings. Consequently, the military pilot is more a systems manager, often doing battle against a target he never sees. It is concluded that unquantifiable human activity requires motivation that is not intrinsic in a machine. E.A.K.

**N82-13683*#** Perceptronics, Inc., Woodland Hills, Calif.

**DECISION AIDS FOR AIRBORNE INTERCEPT OPERATIONS IN ADVANCED AIRCRAFTS**

Azad Madni and Amos Freedy *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 187-209 refs

(Contract N62269-79-C-0496)

Avail: NTIS HC A99/MF A01 CSCL 05H

A tactical decision aid (TDA) for the F-14 aircrew, i.e., the naval flight officer and pilot, in conducting a multitarget attack during the performance of a Combat Air Patrol (CAP) role is presented. The TDA employs hierarchical multiattribute utility models for characterizing mission objectives in operationally measurable terms, rule based AI-models for tactical posture selection, and fast time simulation for maneuver consequence prediction. The TDA makes aspect maneuver recommendations, selects and displays the optimum mission posture, evaluates attackable and potentially attackable subsets, and recommends the 'best' attackable subset along with the required course perturbation. E.A.K.

**N82-13684*#** Systems Technology, Inc., Hawthorne, Calif.

**USING REWARDS AND PENALTIES TO OBTAIN DESIRED SUBJECT PERFORMANCE**

Marcia Cook, Henry R. Jex, Anthony C. Stein, and R. Wade Allen *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Dec. 1981 p 211-222 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Operant conditioning procedures, specifically the use of negative reinforcement, in achieving stable learning behavior is described. The critical tracking test (CTT) a method of detecting human operator impairment was tested. A pass level is set for each subject, based on that subject's asymptotic skill level while sober. It is critical that complete training take place before the individualized pass level is set in order that the impairment can be detected. The results provide a more general basis for the application of reward/penalty structures in manual control research. E.A.K.

**N82-13685*#** Systems Technology, Inc., Mountain View, Calif.

**A COMPARISON OF LANDING MANEUVER PILOTING TECHNIQUE BASED ON MEASUREMENTS MADE IN AN AIRLINE TRAINING SIMULATOR AND IN ACTUAL FLIGHT**

Robert K. Heffley and Ted M. Schulman *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 223-234 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

An emphasis is placed on developing a mathematical model in order to identify useful metrics, quantify piloting technique, and define simulator fidelity. On the basis of DC-10 flight measurements recorded for 32 pilots, 13 flight-trained and the remainder simulator trained, a revised model of the landing flare is hypothesized which accounts for reduction of sink rate and perference for touchdown point along the runway. The flare maneuver and touchdown point adjustment can be described by a pitch attitude command pilot guidance law consisting of attitude and vertical velocity feedbacks. In flight pilots exhibit a significant vertical velocity feedback which is essential for well controlled sink rate reduction at the desired level of response (bandwidth). In the simulator, however, the vertical velocity feedback appears ineffectual and leads to substantially inferior landing performance. T.M.

**N82-13686*#** Systems Technology, Inc., Mountain View, Calif.
**IDENTIFICATION OF MULTILOOP PILOT DESCRIBING FUNCTIONS OBTAINED FROM SIMULATED APPROACHES TO AN AIRCRAFT CARRIER**
Wayne F. Jewell *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 239-244 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
Predicted results of a simulation of the pilot's approach control strategy in the presence of pilot remnant are presented. The aircraft dynamics and the turbulence environment are representative of a trainer-type aircraft. The non-intrusive pilot identification program (NIPIP) was used to identify the pilot's control strategy required by this highly-coupled, multiloop control task. The results are presented in terms of frequency responses of the individual elements of the pilot's control strategy and indicate that NIPIP can identify the pilot's describing functions even in the presence of significant amounts of pilot remnant. T.M.

**N82-13687*#** Douglas Aircraft Co., Inc., Long Beach, Calif.
**FURTHER TESTS OF A MODEL-BASED SCHEME FOR PREDICTING PILOT OPINION RATINGS FOR LARGE COMMERCIAL TRANSPORTS**
W. W. Rickard and W. H. Levison (Bolt, Beranek and Newman, Inc., Cambridge, Mass.) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 245-254 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
A methodology was demonstrated for assessing longitudinal-axis handling qualities of transport aircraft on the basis of closed-loop criteria. Six longitudinal-axis approach configurations were studied covering a range of handling quality problems that included the presence of flexible aircraft modes. Using closed-loop performance requirements derived from task analyses and pilot interviews, predictions of performance/workload tradeoffs were obtained using an analytical pilot/vehicle model. A subsequent manned simulation study yielded objective performance measures and Cooper-Harper pilot ratings that were largely consistent with each other and with analytic predictions. T.M.

**N82-13688*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**AN ANALYTICAL APPROACH FOR PREDICTING PILOT INDUCED OSCILLATIONS**
Ronald A. Hess *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 255-269 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
The optimal control model (OCM) of the human pilot is applied to the study of aircraft handling qualities. Attention is focused primarily on longitudinal tasks. The modeling technique differs from previous applications of the OCM in that considerable effort is expended in simplifying the pilot/vehicle analysis. After briefly reviewing the OCM, a technique for modeling the pilot controlling higher order systems is introduced. Following this, a simple criterion or determining the susceptability of an aircraft to pilot induced oscillations (PIO) is formulated. Finally, a model-based metric for pilot rating prediction is discussed. The resulting modeling procedure provides a relatively simple, yet unified approach to the study of a variety of handling qualities problems. T.M.

**N82-13689*#** Operations Research, Inc., Bethesda, Md.
**A MODEL FOR THE SUBMARINE DEPTHKEEPING TEAM**
John R. Ware, John F. Best, Pamela J. Bozzi, and David W. Kleinman (Connecticut Univ., Storrs) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 271-282 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
The most difficult task the depthkeeping team must face occurs during periscope-depth operations during which they may be required to maintain a submarine several hundred feet long within a foot of ordered depth and within one-half degree of ordered pitch. The difficulty is compounded by the facts that wave generated forces are extremely high, depth and pitch signals are very noisy and submarine speed is such that overall dynamics are slow. A mathematical simulation of the depthkeeping team based on the optimal control models is described. A solution of the optimal team control problem with an output control restriction (limited display to each controller) is presented. T.M.

**N82-13690*#** Analytical Mechanics Associates, Inc., Mountain View, Calif.
**MODELING OF THE AIRCRAFT IN-TRAIL-FOLLOWING TASK DURING PROFILE DESCENT**
T. Goka, J. A. Sorensen, and A. V. Phatak *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 283-294 refs
(Contract NAS1-16135)
Avail: NTIS HC A99/MF A01 CSCL 05H
The cockpit display of traffic information (CDTI) system concepts enable the pilot to observe the surrounding air traffic pattern. The impact of such a system is far reaching in terms of improved safety, pilot and controller workload, and aircraft fuel efficiency. One direct payoff is the ability to distribute the ATC workload to the pilot in such tasks as merging and spacing. The CDTI application of spacing approach aircraft in the terminal area is addressed. In-trail-following/CDTI experiments were performed using realistic cockpit simulators and profile descent approach scenarios. Based on collected experimental simulator data, pilot models were developed which include state estimation, decision making and flight control aspects. These models were coupled with models of aircraft and CDTI equipment to study the dynamic phenomena and stability of strings of aircraft along various approach patterns. T.M.

**N82-13691*#** Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
**COMPARISON OF CLOSED LOOP MODEL WITH FLIGHT TEST RESULTS**
Frank L. George *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 295-300 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
An analytic technique capable of predicting the landing characteristics of proposed aircraft configurations in the early stages of design was developed. In this analysis, a linear pilot-aircraft closed loop model was evaluated using experimental data generated with the NT-33 variable stability in-flight simulator. The pilot dynamics are modeled as inner and outer servo loop closures around aircraft pitch attitude, and altitude rate-of-change respectively. The landing flare maneuver is of particular interest as recent experience with military and other highly augmented vehicles shows this task to be relatively demanding, and potentially a critical design point. A unique feature of the pilot model is the incorporation of an internal model of the pilot's desired flight path for the flare maneuver. T.M.

**N82-13692*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**FUNCTIONAL STRUCTURE AND DYNAMICS OF THE HUMAN NERVOUS SYSTEM**
Joseph A. Lawrence *In its* Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 301-304 refs

Avail: NTIS HC A99/MF A01 CSCL 05H
The status of an effort to define the directions needed to take in extending pilot models is reported. These models are needed to perform closed-loop (man-in-the-loop) feedback flight control system designs and to develop cockpit display requirements. The approach taken is to develop a hypothetical working model of the human nervous system by reviewing the current literature in neurology and psychology and to develop a computer model of this hypothetical working model. T.M.

**N82-13693*#** Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
**ON THE USE OF THE OCM'S QUADRATIC OBJECTIVE FUNCTION AS A PILOT RATING METRIC**

**N82-13694**

David K. Schmidt *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 305-313 refs

(Grant NAG4-1)
Avail: NTIS HC A99/MF A01 CSCL 05H

A correlation between the magnitude of the quadratic objective function from an optimal control pilot model and the subjective rating of the vehicle and task provides a valuable tool for handling qualities research and flight control synthesis. An analysis of simulation results for fourteen aircraft configurations flight tested earlier was conducted. A fixed set of pilot model parameters, are found for all cases in modeling the simulated regulation task. The agreement obtained between performance statistics is shown and a strong correlation was obtained between the cost function and rating. T.M.

**N82-13694*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**A QUASI-NEWTON PROCEDURE FOR IDENTIFYING PILOT-RELATED PARAMETERS OF THE OPTIMAL CONTROL MODEL**

William H. Levison *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 315-328 refs

(Contract F49620-8-C-0073)
Avail: NTIS HC A99/MF A01 CSCL 05H

The development and application of a quasi-Newton gradient search procedure for identifying independent pilot related parameters of the optimal control model for pilot/vehicle systems is reported. A sensitivity analysis procedure which determines whether a given model parameter is required to match a specific experimental result, and which experimentally induced parameter changes are required to account for behavioral and performance differences, is described. Application of the identification scheme to training effects in a manual control task is described. S.L.

**N82-13695*#** Connecticut Univ., Storrs.

**INFORMATION AND DISPLAY REQUIREMENTS FOR AIRCRAFT TERRAIN FOLLOWING**

D. L. Kleinman and J. Korn (ALPHATECH, Inc., Burlington, Mass.) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 329-331 refs

(Contract F33615-80-C-0528)
Avail: NTIS HC A99/MF A01 CSCL 05H

The display design procedure for manned vehicle systems, is applied and validated, for a particular scenario. The scenario chosen is that of zero visibility high speed terrain following (V = 466 ft/sec, H = 200 ft) with an A-10 aircraft. The longitudal (linearized) dynamics are considered. The variations in (command path over) terrain pi(t) are modeled as a third order random process. The display design methodology is based on the optimal control model of pilot response, and employs this model in various ways in different phases of the design process. The overall methodology indicates that the design process is intended as a precursor to manned simulation. It provides a rank ordering of candidate displays through a three level process. S.L.

**N82-13696*#** Texas A&M Univ., College Station.

**A DATA COLLECTION SCHEME FOR IDENTIFICATION OF PARAMETERS IN A DRIVER MODEL**

B. W. Mooring, M. McDermott, and Je-Mang Su *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 333-343 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

A high gain steering controller to compensate for limitations in a handicapped driver's range of motion is employed when adapting vehicle to his use. A driver/vehicle system can become unstable as vehicle speed is increased, therefore it is desirable to use a computer simulation of the driver/vehicle combination as a design tool to investigate the system response prior to construction of a controller and road testing. Unknown driver parameters must be identified prior to use of the model for system analysis. A means to collect the data necessary for identification of these driver model parameters without extensive instrumentation of a vehicle to measure and record vehicle states is addressed. Initial tests of the procedure identified all of the driver parameters with errors of 6% or less. S.L.

**N82-13697*#** Massachusetts Inst. of Tech., Cambridge. Man-Machine Lab.

**TWO-D RESULTS ON HUMAN OPERATOR PERCEPTION**

Alex A. Siapkara (Hellenic Technology Center, Athens) and Thomas B. Sheridan *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 345-359 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The application of multidimensional scaling methodology in human factors engineering is presented. The nonorthogonality of internally perceived task variables is exhibited for first and second order plants with both dependent and independent task variables. Directions of operator preference are shown for actual performance, pilot opinion rating, and subjective measures of fatigue, adaptability, and system recognition. Improvement of performance in second order systems is exhibited by the use of bang-bang feedback information. Dissimilarity measures for system comparison are suggested in order to account for human operator rotations and subjective sense of time. S.L.

**N82-13698*#** Illinois Univ. at Chicago Circle, Chicago. Coll. of Engineering.

**COMPUTATIONAL PROBLEMS IN AUTOREGRESSIVE MOVING AVERAGE (ARMA) MODELS**

Gyan C. Agarwal, Sharin M. Goodarzi, William D. ONeill, and Gerald L. Gottlieb *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 361-377 refs Prepared in cooperation with Rush Medical Center, Chicago

(Grants NSF ENG-76-08754; NS-12877)
Avail: NTIS HC A99/MF A01 CSCL 05H

The choice of the sampling interval and the selection of the order of the model in time series analysis are considered. Band limited (up to 15 Hz) random torque perturbations are applied to the human ankle joint. The applied torque input, the angular rotation output, and the electromyographic activity using surface electrodes from the extensor and flexor muscles of the ankle joint are recorded. Autoregressive moving average models are developed. A parameter constraining technique is applied to develop more reliable models. The asymptotic behavior of the system must be taken into account during parameter optimization to develop predictive models. S.L.

**N82-13699*#** ALPHATECH, Inc., Burlington, Mass.

**MODELING HUMAN TRACKING ERROR IN SEVERAL DIFFERENT ANTI-TANK SYSTEMS**

David L. Kleinman *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 379-392 refs Prepared in cooperation with Connecticut Univ., Storrs

(Contract DAAK11-80-C-0050)
Avail: NTIS HC A99/MF A01 CSCL 05H

An optimal control model for generating time histories of human tracking errors in antitank systems is outlined. Monte Carlo simulations of human operator responses for three Army antitank systems are compared. System/manipulator dependent data comparisons reflecting human operator limitations in perceiving displayed quantities and executing intended control motions are presented. Motor noise parameters are also discussed. M.D.K.

**N82-13700*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**ON THE INTERNAL TARGET MODEL IN A TRACKING TASK**

Alper K. Caglayan and Sheldon Baron *In* JPL Proc. of the 17th Conf. on Manual Control 15 Oct. 1981 p 393-397 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

An optimal control model for predicting operator's dynamic responses and errors in target tracking ability is summarized. The model, which predicts asymmetry in the tracking data, is dependent on target maneuvers and trajectories. Gunners perception, decision making, control, and estimate of target positions and velocity related to crossover intervals are discussed. The model provides estimates for means, standard deviations, and variances for variables investigated and for operator estimates of future target positions and velocities. M.D.K.

**N82-13701*#** CAE Electronics Ltd., Montreal (Quebec).

**MULTI-AXIS MANUAL CONTROLLERS: A STATE-OF-THE-**

**ART REPORT**
A. Lippey, G. M. McKinnon, and M. L. King *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 401-405

Avail: NTIS HC A99/MF A01 CSCL 05H

A literature search was carried out to examine the feasibility of a six degree of freedom hand controller. Factors addressed included related areas, approaches to manual control, applications of manual controllers, and selected studies of the human neuromuscular system. Results are presented. J.M.S.

**N82-13702*#** Messerschmidt-Boelkow G.m.b.H., Munich (West Germany).
**THEORETICAL LINEAR APPROACH TO THE COMBINED MAN-MANIPULATOR SYSTEM IN MANUAL CONTROL OF AN AIRCRAFT**
Klaus Brauser *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 407-418 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

An approach to the calculation of the dynamic characteristics of the combined man manipulator system in manual aircraft control was derived from a model of the neuromuscular system. This model combines the neuromuscular properties of man with the physical properties of the manipulator system which is introduced as pilot manipulator model into the manual aircraft control. The assumption of man as a quasilinear and time invariant control operator adapted to operating states, depending on the flight phases, of the control system gives rise to interesting solutions of the frequency domain transfer functions of both the man manipulator system and the closed loop pilot aircraft control system. It is shown that it is necessary to introduce the complete precision pilot manipulator model into the closed loop pilot aircraft transfer function in order to understand the well known handling quality criteria, and to derive these criteria directly from human operator properties. J.M.S.

**N82-13703*#** MRC Applied Psychology Unit, Cambridge (England).
**THE INFLUENCE OF SHIP MOTION OF MANUAL CONTROL SKILLS**
Peter McLeod, Christopher Poulton, Howard DuRoss (RAE, Farnborough, Engl.), and Wynn Lewis (WSL, Stevenage, Engl.) *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 419-430 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The effects of ship motion on a range of typical manual control skills were examined on the Warren Spring ship motion simulator driven in heave, pitch, and roll by signals taken from the frigate HMS Avenger at 13 m/s (25 knots) into a force 4 wind. The motion produced a vertical r.m.s. acceleration of 0.024g, mostly between 0.1 and 0.3 Hz, with comparatively little pitch or roll. A task involving unsupported arm movements was seriously affected by the motion; a pursuit tracking task showed a reliable decrement although it was still performed reasonably well (pressure and free moving tracking controls were affected equally by the motion); a digit keying task requiring ballistic hand movements was unaffected. There was no evidence that these effects were caused by sea sickness. The differing response to motion of the different tasks, from virtual destruction to no effect, suggests that a major benefit could come from an attempt to design the man/control interface onboard ship around motion resistant tasks. Author

**N82-13704*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**THE ROLE OF MANIPULATOR CHARACTERISTICS IN SELECTING THE IDEAL EFFECTIVE VEHICLE**
Ronald A. Hess *In* JPL Proc. of the 17th Ann. Conf. Manual Control 15 Oct. 1981 p 431-448 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A structural model of the human pilot is introduced and discussed. The model is used to provide a rationale for certain nonlinear pilot control behavior such as stick pulsing and serves as a framework for studying aspects of motor skill development. In light of the theoretical background provided by the model, some past empirical pilot response phenomena are analyzed and shown to be attributable to manipulator or control stick characteristics. In particular, some recent problems associated with pilot/vehicle performance in glideslope tracking in short takeoff and landing (STOL) aircraft are analyzed. The apparent contribution of the cockpit manipulator (throttle) characteristics to these problems are outlined and a solution proposed and evaluated in both simulation and flight test. J.M.S.

**N82-13705*#** General Dynamics/Pomona, Calif.
**COMPUTER AIDED MANUAL TRACKING**
Yung-Koh Yin and Russell F. Berg *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 449-454 ref

Avail: NTIS HC A99/MF A01 CSCL 05H

A scheme was developed to assist the human operator by augmenting an optic sight manual tracking loop with target rate estimates from a computer control algorithm which can either be a Kalman Filter or an alpha, beta, gamma filter. The idea is for the computer to provide rate tracking while the human operator is responsible for nullifying the tracking error. A simple schematic is shown to illustrate the implementation of this concept. A hybrid real-time man-in-loop simulation was used to compare the tracking performance of the same flight trajectory with or without this form of computer-aided track. Preliminary results show the advantage of computer-aided track against high speed aircraft at close range. However, good tracking before target state estimator maturity becomes more critical for aided track than without. Results are presented for a constant velocity flight trajectory. J.M.S.

**N82-13706*#** CAE Electronics Ltd., Montreal (Quebec). Human Factors Engineering.
**DESIGN AND DEVELOPMENT OF A SIX DEGREE OF FREEDOM HAND CONTROLLER**
M. L. King, G. M. McKinnon, and A. Lippey *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 455-463

Avail: NTIS HC A99/MF A01 CSCL 05H

The design objectives of a six degree of freedom manual controller are discussed with emphasis on a space environment. Details covered include problems associated with a zero-g environment, the need to accommodate both 'shirt sleeve' and space suited astronauts, the combination of both manipulator operation and spacecraft flight control in a single device, and to accommodate restraints in space. A variable configuration device designed as a development tool in which rotational axes can be moved relative to one another, is described and its limitations discussed. Two additional devices were developed for concept testing. Each device combines the need for good quality with its ability achieve a wide range of adjustments. J.M.S.

**N82-13707*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**EXPERIMENTAL RESULTS WITH A SIX-DEGREE-OF-FREEDOM FORCE-REFLECTING HAND CONTROLLER**
A. K. Bejczy and M. Handlykken (Technical Univ. of Norway, Trondheim) *In its* Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 465-477 refs

(Contract NAS7-100)
Avail: NTIS HC A99/MF A01 CSCL 05H

Control experiments performed using an isotonic joystick connected to a six degree-of-freedom manipulator equipped with a six dimensional force-torque sensor at the base of the manipulator end effector are described. The preliminary control experiments were aimed at the investigation of the human operators' ability to command and control forces in different directions by varying the information conditions and the values of the feedforward and feedback command gains in the bilateral control loop. The main conclusions are: (1) a quantified graphic display of force-torque information can considerably enhance the operator's ability to perform a quantitatively sharp force-torque control, and (2) there seems to be a task dependent optimal combination of the feedforward and feedback command gain values which provide a dynamically smooth and stable bilateral control performance. J.M.S.

**N82-13708*#** Illinois Univ. at Chicago Circle, Chicago. Bioengineering Program.
**LOAD COMPENSATING REACTIONS TO PERTURBATIONS AT WRIST JOINT IN NORMAL MAN**
R. J. Jaeger, G. C. Agarwal, and G. L. Gottlieb *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 479-501 refs Prepared jointly with Rush Medical Coll.

(Grants NSF ENG-78-08754; NIH-NS-00196; NIH-NS-12877)
Avail: NTIS HC A99/MF A01 CSCL 05H

The electromyographic responses to step torque loads were studied in flexors and extensors at the human wrist. Based on temporal bursting patterns and functional behavior, the response was divided into four temporal components. Two early components, the myotatic (30-60 ms) late myotatic (60-120 ms) appears to be reflex response. The third postmyotatic component (120-200 ms) appear to be a triggered reaction, preceeding the fourth, stabilizing component (200-400 ms). A comparison of response at the wrist with similar data at the ankle provides the basis for a generalized classification of the response in various muscles to torque step perturbations. Author

**N82-13709*#** Southern California Research Inst., Los Angeles.
**MANUAL CONTROL ANALYSIS OF DRUG EFFECTS ON DRIVING PERFORMANCE**
Alison Smiley, Kenneth Ziedman, and Herbert Moskowitz *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 503-514 refs

(Contract NIDA-271-78-3316)
Avail: NTIS HC A99/MF A01 CSCL 05H

The effects of secobarbital, diazepam, alcohol, and marihuana on car-driver transfer functions obtained using a driving simulator were studied. The first three substances, all CNS depressants, reduced gain, crossover frequency, and coherence which resulted in poorer tracking performance. Marihuana also impaired tracking performance but the only effect on the transfer function parameters was to reduce coherence. Author

**N82-13710*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PILOT SCANNING PATTERNS WHILE VIEWING COCKPIT DISPLAYS OF TRAFFIC INFORMATION**
Stephen R. Ellis and Lawrence Stark *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 517-524 refs
Prepared jointly with California Univ., Berkeley

Avail: NTIS HC A99/MF A01 CSCL 05H

Scanning eye movements of airline pilots were recorded while they judged air traffic situations displayed on cockpit displays of traffic information (CDTI). The observed 1st order transition patterns between points of interest on the display showed reliable deviation from those patterns predicted by the assumption of statistical independence. However, both patterns of transitions correlated quite well with each other. Accordingly, the assumption of independence provided a surprisingly good model of the results. Nevertheless, the deviation between the observed patterns of transition and that based on the assumption of independence was for all subjects in the direction of increased determinism. Thus, the results provide objective evidence consistent with the existence of 'scanpaths' in the data. Author

**N82-13711*#** California Univ., Berkeley.
**PUPILLOMETRY, A BIOENGINEERING OVERVIEW**
G. Myers, J. Anchetta, B. Hannaford, P. Peng, K. Sherman, L. Stark, F. Sun, and S. Usui *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 525-536 refs
Sponsored by NIH
(Contract NCC2-86)
Avail: NTIS HC A99/MF A01 CSCL 05H

The pupillary control system is examined using a microprocessor based integrative pupillometer. The real time software functions of the microprocessor include: data collection, stimulus generation and area to diameter conversion. Results of an analysis of linear and nonlinear phenomena are presented. J.M.S.

**N82-13712*#** California Univ., Berkeley.
**MODEL SIMULATION STUDIES TO CLARIFY THE EFFECT ON SACCADIC EYE MOVEMENTS OF INITIAL CONDITION VELOCITIES SET BY THE VESTIBULAR OCULAR REFLEX (VOR)**
Moon-Hyun Nam, Jack M. Winters, and Lawrence Stark *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 537-548 refs Sponsored by the Korean Ministry of Education
(Contract NCC2-86)
Avail: NTIS HC A99/MF A01 CSCL 05H

Voluntary active head rotations produced vestibulo-ocular reflex eye movements (VOR) with the subject viewing a fixation target. When this target jumped, the size of the refixation saccades were a function of the ongoing initial velocity of the eye. Saccades made against the VOR were larger in magnitude. Simulation of a reciprocally innervated model eye movement provided results comparable to the experimental data. Most of the experimental effect appeared to be due to linear summation for saccades of 5 and 10 degree magnitude. For small saccades of 2.5 degrees, peripheral nonlinear interaction of state variables in the neuromuscular plant also played a role as proven by comparable behavior in the simulated model with known controller signals. Author

**N82-13713*#** California Univ., Berkeley.
**BENEFITS OF DETAILED MODELS OF MUSCLE ACTIVATION AND MECHANICS**
Steven L. Lehman and Lawrence Stark *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 546-556 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

Recent biophysical and physiological studies identified some of the detailed mechanisms involved in excitation-contraction coupling, muscle contraction, and deactivation. Mathematical models incorporating these mechanisms allow independent estimates of key parameters, direct interplay between basic muscle research and the study of motor control, and realistic model behaviors, some of which are not accessible to previous, simpler, models. The existence of previously unmodeled behaviors has important implications for strategies of motor control and identification of neural signals. New developments in the analysis of differential equations make the more detailed models feasible for simulation in realistic experimental situations. Author

**N82-13714*#** National Aerospace Lab., Amsterdam (Netherlands).
**A MODEL OF THE HUMAN OBSERVER AND DECISION MAKER**
P. H. Wewerinke *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 557-570 refs

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The decision process is described in terms of classical sequential decision theory by considering the hypothesis that an abnormal condition has occurred by means of a generalized likelihood ratio test. For this, a sufficient statistic is provided by the innovation sequence which is the result of the perception an information processing submodel of the human observer. On the basis of only two model parameters, the model predicts the decision speed/accuracy trade-off and various attentional characteristics. A preliminary test of the model for single variable failure detection tasks resulted in a very good fit of the experimental data. In a formal validation program, a variety of multivariable failure detection tasks was investigated and the predictive capability of the model was demonstrated. A.R.H.

**N82-13715*#** Lockheed Electronics Co., Plainfield, N. J.
**HUMAN SUPERVISION AND MICROPROCESSOR CONTROL OF AN OPTICAL TRACKING SYSTEM**
William J. Bigley and John D. Vandenberg *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 571-582 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

Gunners using small calibre anti-aircraft systems have not been able to track high-speed air targets effectively. Substantial improvement in the accuracy of surface fire against attacking aircraft has been realized through the design of a director-type weapon control system. This system concept frees the gunner to exercise a supervisory/monitoring role while the computer takes over continuous target tracking. This change capitalizes on a key consideration of human factors engineering while increasing system accuracy. The advanced system design, which uses distributed microprocessor control, is discussed at the block diagram level and is contrasted with the previous implementation. Author

**N82-13716*#** Systems Technology, Inc., Hawthorne, Calif.
**A THEORY OF HUMAN ERROR**
Duane T. McRuer, Warren F. Clement, and R. Wade Allen *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 583-594 refs

(Contract NAS2-10400)
Avail: NTIS HC A99/MF A01 CSCL 05H

Human errors tend to be treated in terms of clinical and anecdotal descriptions, from which remedial measures are difficult to derive. Correction of the sources of human error requires an attempt to reconstruct underlying and contributing causes of error from the circumstantial causes cited in official investigative reports. A comprehensive analytical theory of the cause-effect relationships governing propagation of human error is indispensable to a reconstruction of the underlying and contributing causes. A validated analytical theory of the input-output behavior of human operators involving manual control, communication, supervisory, and monitoring tasks which are relevant to aviation, maritime, automotive, and process control operations is highlighted. This theory of behavior, both appropriate and inappropriate, provides an insightful basis for investigating, classifying, and quantifying the needed cause-effect relationships governing propagation of human error. A.R.H.

**N82-13717*#** Systems Technology, Inc., Hawthorne, Calif.
**STABILITY ANALYSIS OF AUTOMOBILE DRIVER STEERING CONTROL**
R. Wade Allen *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 597-609 refs Sponsored in part by the Ford Motor Co.
Avail: NTIS HC A99/MF A01 CSCL 05H

In steering an automobile, the driver must basically control the direction of the car's trajectory (heading angle) and the lateral deviation of the car relative to a delineated pathway. A previously published linear control model of driver steering behavior which is analyzed from a stability point of view is considered. A simple approximate expression for a stability parameter, phase margin, is derived in terms of various driver and vehicle control parameters, and boundaries for stability are discussed. A field test study is reviewed that includes the measurement of driver steering control parameters. Phase margins derived for a range of vehicle characteristics are found to be generally consistent with known adaptive properties of the human operator. The implications of these results are discussed in terms of driver adaptive behavior. Author

**N82-13718*#** Systems Technology, Inc., Hawthorne, Calif.
**DETECTING HUMAN OPERATOR IMPAIRMENT WITH A PSYCHOMOTOR TASK**
R. Wade Allen, Anthony C. Stein, and Henry R. Jex *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 611-625 refs
(Contract DOT-HS-8-02052)
Avail: NTIS HC A99/MF A01 CSCL 05H

Psychomotor tasks have long been used as instruments for measuring human operator behavior and have often been proposed as selection and training devices. The application of the 'Critical-instability Tracking Test' (CTT) in the detection of alcohol impaired human operators is discussed. The detection problem wherein statistical decision theory is used to optimize the test's ability to discriminate impaired operators in the face of inherent variability in human performance is considered. Testing strategy is examined including setting performance criteria levels and determining the number of attempts permitted in order to pass the test. Also, the task's ability to detect operator impairment is compared to performance measures obtained in a driving simulator. A.R.H.

**N82-13719*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**VOICE CONTROL OF THE SPACE SHUTTLE VIDEO SYSTEM**
A. K. Bejczy, R. S. Dotson, J. W. Brown, and J. L. Lewis *In its* Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 627-640 Prepared in cooperation with NASA. Johnson Space Center
(Contract NAS7-100)
Avail: NTIS HC A99/MF A01 CSCL 05H

A pilot voice control system developed at the Jet Propulsion Laboratory (JPL) to test and evaluate the feasibility of controlling the shuttle TV cameras and monitors by voice commands utilizes a commercially available discrete word speech recognizer which can be trained to the individual utterances of each operator. Successful ground tests were conducted using a simulated full-scale space shuttle manipulator. The test configuration involved the berthing, maneuvering and deploying a simulated science payload in the shuttle bay. The handling task typically required 15 to 20 minutes and 60 to 80 commands to 4 TV cameras and 2 TV monitors. The best test runs show 98 to 100 percent voice recognition accuracy. A.R.H.

**N82-13720*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
**A COMPARISON OF HEAD AND MANUAL CONTROL FOR A POSITION-CONTROL PURSUIT TRACKING TASK**
William H. Levison, Greg L. Zacharias, James L. Porterfield, Donald Monk, and Christopher Arbak *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 641-652 refs Prepared jointly with Aerospace Medical Div., Aerospace Medical Research Labs. (6570th)

Avail: NTIS HC A99/MF A01 CSCL 05H

Head control was compared with manual control in a pursuit tracking task involving proportional controlled-element dynamics. An integrated control/display system was used to explore tracking effectiveness in horizontal and vertical axes tracked singly and concurrently. Compared with manual tracking, head tracking resulted in a 50 percent greater rms error score, lower pilot gain, greater high-frequency phase lag and greater low-frequency remnant. These differences were statistically significant, but differences between horizontal- and vertical-axis tracking and between 1- and 2-axis tracking were generally small and not highly significant. Manual tracking results were matched with the optimal control model using pilot-related parameters typical of those found in previous manual control studies. Head tracking performance was predicted with good accuracy using the manual tracking model plus a model for head/neck response dynamics obtained from the literature. Author

**N82-13721*#** Tufts Univ., Medford, Mass. Dept. of Engineering Design.
**INTERRUPTION AS A TEST OF THE USER-COMPUTER INTERFACE**
John G. Kreifeldt and Mary E. McCarthy *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 655-667 refs
Avail: NTIS HC A99/MF A01 CSCL 05H

In order to study the effects different logic systems might have on interrupted operation, an algebraic calculator and a reverse polish notation calculator were compared when trained users were interrupted during problem entry. The RPN calculator showed markedly superior resistance to interruption effects compared to the AN calculator although no significant differences were found when the users were not interrupted. Causes and possible remedies for interruption effects are speculated. It is proposed that because interruption is such a common occurrence, it be incorporated into comparative evaluation tests of different logic system and control/display system and that interruption resistance be adopted as a specific design criteria for such design. A.R.H.

**N82-13722*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**A MODEL FOR THE CONTROL MODE MAN-COMPUTER INTERFACE DIALOGUE**
Roy L. Chafin *In its* Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 669-682 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A four stage model is presented for the control mode man-computer interface dialogue. It consists of context development, semantic development syntactic development, and command execution. Each stage is discussed in terms of the operator skill levels (naive, novice, competent, and expert) and pertinent human factors issues. These issues are human problem solving, human memory, and schemata. The execution stage is discussed in terms of the operators typing skills. This model provides an understanding of the human process in command mode activity for computer systems and a foundation for relating system characteristics to operator characteristics. Author

**N82-13723*#** Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
**STRUCTURE OF THE KNOWLEDGE BASE FOR AN EXPERT LABELING SYSTEM**
N. S. Rajaram *In* JPL Proc. of the 17th Ann. Conf. on Manual Control 15 Oct. 1981 p 683-688 refs

(Contract NAS9-15800)
Avail: NTIS HC A99/MF A01 CSCL 05H

One of the principal objectives of the NASA AgRISTARS program is the inventory of global crop resources using remotely sensed data gathered by Land Satellites (LANDSAT). A central problem in any such crop inventory procedure is the interpretation of LANDSAT images and identification of parts of each image which are covered by a particular crop of interest. This task of labeling is largely a manual one done by trained human analysts and consequently presents obstacles to the development of totally automated crop inventory systems. However, development in knowledge engineering as well as widespread availability of inexpensive hardware and software for artificial intelligence work offers possibilities for developing expert systems for labeling of crops. Such a knowledge based approach to labeling is presented. Author

**N82-13724#** Anthropology Research Project, Yellow Springs, Ohio.
**ANTHROPOMETRIC SIZING SYSTEMS FOR ARMY WOMEN'S FIELD CLOTHING**
Kathleen Robinette, Thomas Churchill, and John T. McConville Natick, Mass. Army Research and Development Lab. Mar. 1981 231 p
(Contract DAAK60-79-C-0097)
(AD-A102104; NATICK-TR-81/026; CEMEL-233) Avail: NTIS HC A11/MF A01 CSCL 05/1

A series of anthropometricaly based sizing programs and tariffs for Army women's field clothing are reported are size systems for upper body, lower body and total body garments are included. Sizing tables on which recommended values for some 59 dimensions relevant to garment construction are highlighted for easy identification are presented. Regression equations, rather than more traditional methods, were used to develop the sizing data and supportive material to permit designers to modify suggested dimensional values or to compute alternative sizing programs. A visual index accompanied by measurement descriptions, and bivariate distribution tables on which size categories have been graphically superimposed serve as visual references for users. Author

**N82-13725#** Air Force Human Resources Lab., Brooks AFB, Tex. Manpower and Personnel Div.
**WEIGHTING OF APTITUDE COMPONENTS BASED ON DIFFERENCES IN TECHNICAL SCHOOL DIFFICULTY Interim Report, 1 Jun. 1980 - 1 Apr. 1981**
C. J. Mullins, James A. Earles, and Malcolm Ree Jul. 1981 20 p refs
(AD-A102045; AFHRL-TR-81-19) Avail: NTIS HC A02/MF A01 CSCL 05/9

A method of adjusting technical school grades issued by schools of varying difficulty so that a new criterion is formed with all school grades adusted to the same metric was evaluated. This new criterion was used to recompute aptitude indexes which were compared with aptitude indexes computed in the conventional manner. It is found that the new aptitude indexes predict school grades in a cross validation sample better than the conventional aptitude indexes. Author

**N82-13726#** Carl-Cranz-Gesellschaft e.V., Brunswick (West Germany). Lehrgangsreihe Flugtechnik.
**TAXONOMY OF THE HUMAN FACTORS IN MAN MACHINE SYSTEMS [TAXONOMIE DER HUMANFAKTOREN IN MENSCH-MASCHINE-SYSTEMEN]**
K. Steininger (DFVLR, Hamburg) 1980 30 p refs In GERMAN
Avail: NTIS HC A03/MF A01

The human factors in man-machine systems are presented in a global model showing the manifold interplay between man, technical system and management. The psychic and social constraints involved are stressed. The nature of human error is also treated by means of a classification and the relation between work load and perceived stress is discussed. On the basis of these classifications, ergonometric methods and concepts for human factor engineering are derived and proposed for further investigations are formulated. Author (ESA)

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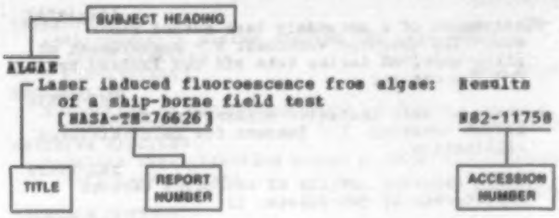

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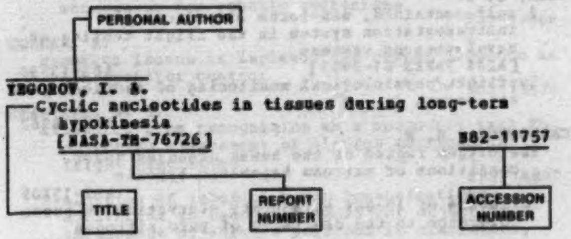

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# AEROSPACE MEDICINE AND BIOLOGY

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## (Supplement 231)

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 284 reports, articles and other documents announced during March 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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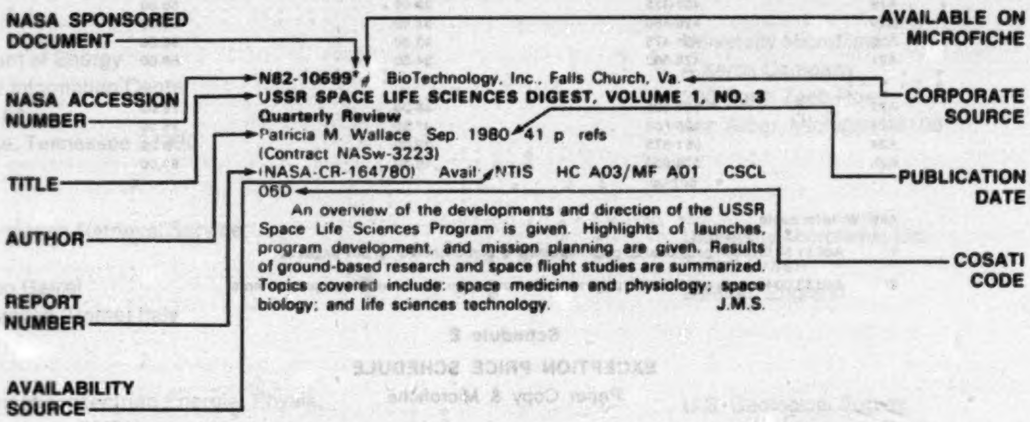
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An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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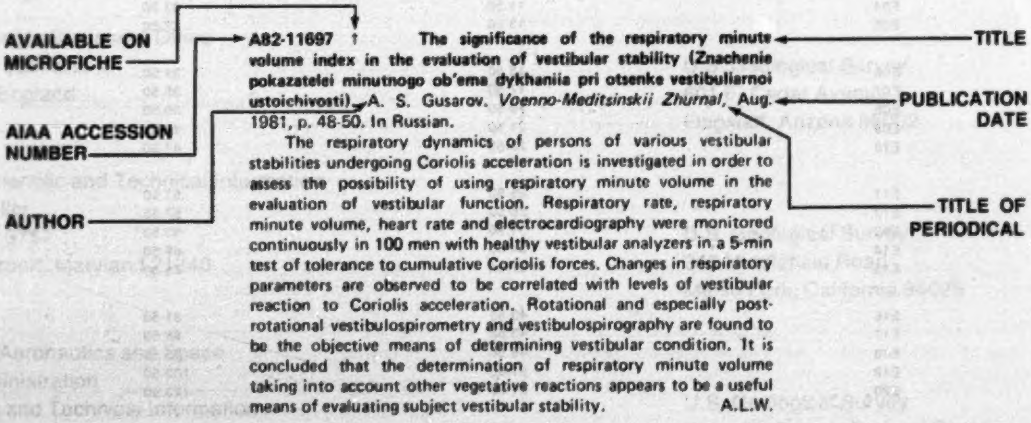
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**A82-11697** # **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti)** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## A Continuing Bibliography (Suppl. 231)

APRIL 1982

## IAA ENTRIES

**A82-16125** **Disappearance of stabilized chromatic gratings.** D. H. Kelly (SRI International, Menlo Park, CA). *Science*, vol. 214, Dec. 11, 1981, p. 1257, 1258. 9 refs. Grant No. NIH-EY-01128.

When the image of a stationary, sinusoidal luminance grating is stabilized on the retina of a human subject, he becomes unable to detect this stimulus at contrasts that are readily visible in normal, unstabilized vision. At much higher contrasts, such stabilized gratings can still be seen over most of the normal range of spatial frequencies, although the threshold contrast may be increased by as much as 20 or 30 times. When the analogous experiment is performed with an isoluminance chromatic grating, however, there is no contrast that can restore the visibility of the stabilized grating; the threshold elevations for stabilized chromatic gratings are too great to measure. Saturation red/green gratings fade out and disappear at 100% contrast (even where this is 45 times the unstabilized threshold), and they do not reappear as long as stabilization is maintained. Without some kind of temporal variation of the proximal stimulus, the opponent-color pathways apparently do not respond to spatial patterns. (Author)

**A82-16167** **Computer-enhanced thallium scintigrams in asymptomatic men with abnormal exercise tests.** G. S. Uhl, T. N. Kay, and J. R. Hickman, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, TX). *American Journal of Cardiology*, vol. 48, Dec. 1981, p. 1037-1043. 37 refs.

The usefulness of computer-enhanced thallium-201 myocardial perfusion scintigraphy in excluding the diagnosis of coronary artery disease in asymptomatic patients showing abnormal exercise electrocardiograms is evaluated. Multigated thallium scans were obtained immediately following and 3 or 4 hours after maximal exercise testing in 191 consecutive asymptomatic Air Force aircrew members who had shown abnormal exercise electrocardiograms and who were due to undergo coronary angiography. Computer enhancement of the raw images is found to lead to four false positive and two false negative scintigrams as revealed by angiographic results, while the group of 15 with subcritical coronary disease exhibited equivocal results. Results reveal that enhanced thallium scintigrams are an accurate diagnostics tool in detecting myocardial ischemia in asymptomatic patients and may be used in counseling asymptomatic patients on their likelihood of having coronary artery disease. A.L.W.

**A82-16274** † **Changes in blood indicators upon the inclusion of trace elements in the diet (Izmenenie pokazatelei krovi pri vkliuchenii v ratsion pitaniia mikroelementov).** V. Ia. Rusin, V. V. Nasolodin, and V. A. Suvorov. *Voenno-Meditsinskii Zhurnal*, Oct. 19[illegible], p. 44-46. 8 refs. In Russian.

Results are presented of two series of experiments aimed at assessing seasonal changes in human work capacity and blood factors and the effects of trace element dietary supplements on these factors. Measurements of work capacity, body vitamin C content, metallic enzyme activity, serum protein spectra and immune and hematopoetic conditions were made at various times of the year in healthy young subjects, and in the spring in a second group of subjects receiving supplemental iron, copper, and manganese in combination with ascorbic acid and the pharmacological agent dibazol, which acts to stimulate the body's defenses. Vitamin C supplies and levels of proteins, albumins, alpha-globulins, lysozyme and serum complement are found to be significantly higher in the autumn-winter period than in the spring and summer, while concentrations of beta- and gamma-globulins increase in the summer. Physical work capacity and metallic enzyme activities are observed to depend more on individual motor activity than on the time of year. The combination of the mineral complex with vitamin C and dibazol supplements is shown to lead to greater increases in hemoglobin concentration, erythrocyte numbers, peroxidase and ceruloplasmin activities, vitamin C supplies, physical work capacity, alpha- and beta-globulin contents and serum lysozyme titers than vitamin C supplements alone, and is thus recommended for improving physical capacities. A.L.W.

**A82-16275** † **Functional characteristics of the pilot hypothalamus-hypophysis-adrenal cortex system (Osobennosti funktsionirovaniia u letchikov sistemy gipotalamus-gipofiz-kora nadpochechnikov).** A. A. Novitskii, N. F. Markizova, and A. Iu. Kulidzhanov. *Voenno-Meditsinskii Zhurnal*, Oct. 1981, p. 50-53. In Russian.

Results are presented of an extended study of the functional characteristics of the hypothalamus-hypophysis-adrenal cortex (HHAC) system in flight personnel in the interflight period. System activities were determined by measurements of blood plasma levels of ACTH and 11-oxycorticosteroid and urinary levels of 17-oxycorticosteroid, 17-ketosteroid and dehydroepiandrosteroid in pilots having not flown for at least two weeks prior to the investigation. These indicators reveal that HHAC activity is elevated in pilots with respect to age-matched controls. Significant differences between HHAC system activity were not found between the various age groups, however. The intramuscular injection of 40 units of ACTH is found to lead to sizeable increases in the levels of 17-oxycorticosteroids and 17-ketosteroids excreted by the control subjects, however not in the pilots, indicating the depletion of physiological reserves in the pilot adrenal cortex. Greater levels of ACTH activity are found in pilots in the early stages of the profession, and in flight commanders. It is suggested that the HHAC systems of pilots function under a greater degree of stress than those of persons not involved in flight activities. A.L.W.

**A82-16288** † **Determination of the angular orientation of the body of a walking machine (Ob opredelenii uglovoi orientatsii korpusa shagaiushchego apparata).** V. B. Larin and K. I. Naumenko (Akademiia Nauk Ukrainskoi SSR, Institut Matematiki, Kiev, Ukrainian SSR). *Matematicheskaia Fizika*, no. 30, 1981, p. 18-24. 7 refs. In Russian.

A nonlinear algorithm for estimating the Rodrigues-Hamilton parameters for the body of a walking machine is developed. The algorithm relies on measurements of the angular velocity vector of the body of the machine and of the vertical vector in a moving coordinate system. The algorithm is based on the least squares method and is orientated towards implementation on a digital computer. B.J.

**A82-16701** **Astronaut activity in flight and enhancement of its efficiency (Deiatel'nost' kosmonavta v polete i povyshenie ee effektivnosti).** Edited by G. T. Beregovoi and L. S. Khachatur'iants. Moscow, Izdatel'stvo Mashinostroenie, 1981. 264 p. In Russian.

The general problems of manned space flight, the interaction of the astronaut and the spacecraft control systems, technical servicing and extravehicular activity, and the influence of flight factors on astronaut performance are among the topics discussed. Particular attention is given to current problems of the psychophysiology of astronaut work, the statistical characteristics of astronaut operator activity directed at spacecraft control, simulation of operator activity in the technical servicing of a space station, and the influence of emotional stress on astronaut activity. B.J.

**A82-16702** † **Basic principles and methods for assuring the efficiency of astronaut activity in flight (Osnovnye printsipy i metody obespecheniia effektivnosti deiatel’nosti kosmonavta v polete).** G. T. Beregovoi. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 6-13. In Russian.

A human-factors approach is taken to the evaluation of in-flight astronaut performance. Data characterizing the deterioration of astronaut performance at various stages of flight are presented, and various ways to compensate for this deterioration are discussed. The integration of the astronaut into various spacecraft control systems is considered. B.J.

**A82-16703** † **Current problems in the psychophysiology of space work /status and future prospects/ (Aktual’nye problemy psikhofiziologii kosmicheskogo truda /sostoianie i prognoz/).** L. S. Khachatur’iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 13-25. In Russian.

Various problems in the psychophysiology of astronaut work are considered, including problems involving the dynamics and level of analyzer system functions in the course of space flight, and the investigation of the psychophysiological phases of flight. These problems are discussed with reference to astronaut selection and training, ascent, descent, and landing phases, and orbital and interplanetary flight. Possible future trends in the psychophysiology of astronaut work are also discussed. B.J.

**A82-16704** † **Concerning a model of human activity (O modeli deiatel’nosti cheloveka).** G. M. Kolesnikov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 25-46. In Russian.

A general functional-structural model of human activity is developed. From the functional point of view, the model incorporates the following subsystems: the subsystem of reflection of and action upon the external medium; the subsystem of the reflection of the internal medium on the basis of information about the external medium; and the subsystem of energy supply, and creation and conservation of structure. Human activity is always connected with the simultaneous functioning of all the subsystems under a definite domination of one of them at each stage of activity. B.J.

**A82-16705** † **Certain theoretical features of astronaut preparation (O nekotorye teoreticheskie osobennosti podgotovki kosmonavtov).** G. T. Beregovoi, P. R. Popovich, and G. M. Kolesnikov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 46-58. In Russian.

Theoretical questions relating to astronaut preparation and training are examined, with attention given to adaptation in both the physiological and psychological senses. Techniques of intellectual preparation are discussed, with emphasis on problem learning. B.J.

**A82-16706** † **The use of a psychophysiological feedback system for purposes of activity optimization (Ispol’zovanie sistemy obratnoi psikhofiziologicheskoi sviazi v interesakh optimizatsii deiatel’nosti).** M. V. Frolov and L. S. Khachatur’iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 58-74. In Russian.

The development of a three-loop feedback system for the optimal control of operator activity is considered. Attention is given to methods for evaluating the functional state of an operator based on the analysis of working conditions and variations of physiological signals. As an example, an analysis is presented of states of attention and emotional stress. B.J.

**A82-16707** † **Psychophysiological correlates of the control activity of the astronaut (Psikhofiziologicheskie korreliaty upravliaiushchei deiatel’nosti kosmonavta).** L. S. Khachatur’iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 75-86. In Russian.

An abstract algorithmic scheme of astronaut activity is developed, and schemes of human-operator activity in various types of control systems are presented. It is shown that by using the abstract algorithmic scheme the designer can 'adapt' technology to man for the functional state which is expected in the actual conditions of activity. B.J.

**A82-16708** † **Certain aspects of the visual activity of astronauts (Nekotorye aspekty vizual’noi deiatel’nosti kosmonavta).** E. A. Ivanov and A. Ia. Frolov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 86-100. In Russian.

The paper considers visual observations by astronauts of space objects (e.g., spacecraft that are the objects of rendezvous or docking) illuminated by the sun against the black background of the sky; the visual recognition of such objects is particularly difficult under such illumination conditions. The psychophysiological characteristics of visual pattern recognition and the functional state of the visual analyzer of the astronaut are theoretically evaluated, and experimental results obtained with the Proba visual simulator are examined. B.J.

**A82-16709** † **Methodological principles of the investigation of pilot error (O metodologicheskikh osnovakh izucheniia oshibochnykh deistvii cheloveka, upravliaiushchego letatel’nym apparatom).** N. D. Zavalova and V. A. Ponomarenko. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 100-116. In Russian.

It is argued that the methodology of investigating pilot error has been flawed by taking the concept of personal factors, rather than error theory, to be the underlying postulate. This paper proposes an engineering-psychological systems approach to the study of pilot error. B.J.

**A82-16710** † **Problems of the control of operator state (Problemy upravleniia sostoianiem operatora).** L. P. Grimak and L. S. Khachatur’iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 116-137. In Russian.

A survey is presented of problems involved in the control of human-operator state, with particular reference to astronaut performance in flight. A classification of the psychophysiological mechanisms responsible for the formation of operator states is presented. B.J.

**A82-16711** † **Optimization of astronaut operator activity and systems of semiautomatic control of manned spacecraft on the basis of probabilistic criteria (Optimizatsiia operatorskoi deiatel’nosti kosmonavta i sistem poluavtomaticheskogo upravleniia pilotiruemykh kosmicheskikh korablei po veroiatnostnym kriteriiam).** G. T. Beregovoi, V. M. Vasilets, and A. I. Iakovlev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel’stvo Mashinostroenie, 1981, p. 138-146. In Russian.

It is proposed that parametric methods be used to statistically optimize astronaut operator activity and systems of semiautomatic control of manned spacecraft. The basic idea of the approach consists in the development of algorithms that make it possible to select certain controls or parameters (considered as points of a certain space) that satisfy specified constraints and minimize or maximize a specified criterion for a certain number of astronauts participating in the control. The approximation of the control functions in a finite-dimensional space and the limitation of the number of system structure variants make it possible to represent the performance criterion as a function of a finite number of variables and thus to obtain the solution of the optimized problems. B.J.

**A82-16712** † **Investigation of the statistical characteristics of astronaut operator activity directed towards the control of a manned spacecraft (Issledovanie statisticheskikh kharakteristik**

**operatorskoi deiatel'nosti kosmonavta po upravleniiu PKA).** B. V. Volynov, V. M. Vasilets, E. D. Sukhanov, and A. I. Iakovlev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 146-155. In Russian.

The dynamic characteristics of astronaut operator activity were studied on simulators, the ultimate purpose of the tests being to provide information for the design of manual control systems. Correlation functions and spectral densities of operator errors were obtained, assuming that the random processes that were analyzed were stationary and ergodic. B.J.

**A82-16713** † **Investigation of astronaut activity under conditions of the hydrosimulation of weightlessness (Issledovanie deiatel'nosti kosmonavtov v usloviiakh modelirovannoi nevesomosti v gidrosrede).** G. I. Vorob'ev and L. D. Smirichevskii. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 156-161. In Russian.

An analysis is presented of the possibilities of the hydrosimulation of weightlessness, where the subject to be tested is submerged in water and a state of zero buoyancy is created. Experimental results are presented concerning the use of weightlessness hydrosimulation in the investigation of astronaut activity, and it is found that simulation results agree with data from actual space flight. It is concluded that the hydrosimulation technique is suitable for astronaut training, for purposes of spacecraft design, and for the development of astronaut-activity cyclograms. B.J.

**A82-16714** † **Experimental study of the characteristics of the detection of objects on a TV display by an operator under conditions of time deficit (Eksperimental'noe issledovanie kharakteristik obnaruzheniia ob'ektov operatorom na televizionnom indikatore v usloviiakh defitsita vremeni).** V. N. Zhovinskii. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 161-166. In Russian.

The present study examines the ability of an operator to detect small objects on a TV display in the case when the observation time period is sufficiently small (up to 3 sec), which corresponds to time-deficit conditions. It is found that the probability of detection increases with exposure time to a certain constant level whose value is determined by the background complexity. It is also found that the mean time of making erroneous decisions in the detection process exceeds the mean time of making correct decisions under time-deficit conditions. B.J.

**A82-16716** † **The design of extravehicular propulsion units (Ob ustroistve sredstv peremeshcheniia kosmonavta v otkrytom kosmose).** Iu. N. Glazkov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 172-178. In Russian.

The paper describes a self-maneuvering unit that combines jet backpacks with two and three degree of freedom controllable gyroscopes. Block diagrams of of this type of self-maneuvering unit are presented, and attention is given to a number of design problems. B.J.

**A82-16717** † **Simulation of operator activity in a system for the technical servicing of a space station (Modelirovanie deiatel'nosti operatora v sisteme tekhnicheskogo obsluzhivaniia kosmicheskoi stantsii).** E. N. Stepanov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 178-183. In Russian.

Two 30-day experiments are described in which operator activity involving the technical servicing and maintenance of a space station was simulated. Emphasis was placed on the influence of adaptation period, 30-day continuous activity, and 30-day habitation in an isolated and confined space on the operator work capacity and reliability. It was found that the productivity and reliability of repair and servicing work performed under space-station conditions were lower than under ordinary (i.e., non-space) conditions. B.J.

**A82-16718** † **Information model of the dynamics of autonomous extravehicular activity (Informatsionnaia model' dinamiki avtonomnogo dvizheniia kosmonavta v otkrytom kosmose).** E. V. Dement'ev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 183-187. In Russian.

It is shown that a method of parallel approach control and human visual capacity make it possible to develop a simple extravehicular propulsion unit with total or partial determination of the parameters of relative motion by the astronaut himself. A functional block diagram of the manual control system for this unit is presented. Since he actively participates in the control of the unit, the astronaut acquires information about the actual state of the control process through its information model. The degree of work intensity will depend, in part, on the quantity and character of control parameters indicated on the display devices. B.J.

**A82-16719** † **Simulation of manual autonomous control of an extravehicular propulsion unit /EPU/ (Modelirovanie ruchnogo avtonomnogo upravleniia ustanovkoi peremeshcheniia kosmonavta /UPK/).** L. P. Grimak and E. V. Dement'ev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 187-191. In Russian.

The paper considers the simulation of the mutual control of an EPU on a simulation test stand, with emphasis on the influence of the psychic and emotional state of the operator. Particular attention is given to the types of vegetative reactions in approach control at various control stages, and to variations of the terminal control parameters as a function of the simulated operator states. It is found that the experienced psychic state has a marked effect not only on the motor functions of the arms but also on the visual analyzer functions. B.J.

**A82-16720** † **The influence of certain habitation conditions on the physiological functions, work capacity, and dream dynamics of man (K voprosu o vliiani nekotorykh uslovii obitaniia na fiziologicheskie funktsii, rabotosposobnosti i dinamiku sna cheloveka).** A. N. Litson, A. Ia. Frolov, V. N. Artishchuk, and A. V. Chapaev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 192-198. In Russian.

The paper describes an experiment which studied the level of physiological activity, work capacity, and dream dynamics of two operators engaged in the task of the technical servicing and repair of a simulated space station with an autonomous life support system in the course of 94 days. It is found that variations of the three factors studied have a marked adaptational character, and the conditions of habitation were found to have a marked effect on motor-analyzer indices. It is concluded that the present data can be used in constructing circadian cyclograms for the activity of operators working in unusual conditions. B.J.

**A82-16721** † **Investigation of the functions of an astronaut operator in information systems (Issledovanie funktsii kosmonavta-operatora v informatsionnykh sistemakh).** N. N. Fefelov and E. A. Cherenkova. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 198-205. In Russian.

An analysis is presented of astronaut speech performance in ground-space and space-ground communication channels. Some recommendations are made concerning the planning of operational communications and the preparation of onboard documentation. It is noted that the form in which the onboard documentation is presented determines the information processing rate and the quality of astronaut performance. It is also noted that the use of short sentences, and concrete and common words make the communications more effective. B.J.

**A82-16722** † **The effect of emotional stress on astronaut activity in a radio-telegraphy system (Vliianie emotsional'nogo napriazheniia na deiatel'nost' kosmonavta v sisteme radiotelegrafnoi sviazi).** A. K. Epishkin. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 205-208. In Russian.

Space flight simulation results are presented concerning the effects of three factors that lead to emotional stress-acceleration loading, weightlessness, and a life-threatening situation - on the performance of an astronaut operator in a radio-telegraphy system. It is found that these three factors produce emotional stress that has a definite effect on the psychophysiological characteristics of the operator. Psychic processes associated with the recoding of information and motor coordination are affected. The results confirm that emotional stress has an adverse effect on astronaut activity in flight. B.J.

**A82-16723 † Comparative psychophysiological evaluation of the effectiveness of psychic models of body hypo- and hyperponderousness (Sravnitel'naia psikhofiziologicheskaia otsenka effektivnosti psikhicheskikh modelei gipo- i gipervesomosti tela).** L. P. Grimak. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 208-222. In Russian.

The effectiveness of hypnotically induced states of subjective increases or decreases in body weight is evaluated in light of the potential of such states in the investigation and prophylaxis of the effects of weightlessness encountered during extended space flights. Results are presented of an experiment in which subjects previously exposed to rotation on a centrifuge at 6 g and a short period of weightlessness were subjected to 10 days of strict bed rest alone, or under hypnotic suggestions of either weightlessness or heaviness. Subjective reactions, EEGs, EKGs, REGs, venous pressures, pulse rates, tracking performances, and cardiac morphologies monitored over the course of the experiment reveal clear differences in the reactions of the subjects according to the suggestion employed. The psychic model of hypoponderousness is observed to produce more pronounced changes than observed in an equivalent period of hypokinesia, including a reduction in heart size and tracking ability, while hyperponderousness in many ways acts to counteract the deleterious effects of extended bed rest, particularly with respect to operator activity. A.L.W.

**A82-16724 † Concerning the rationalization of the work and rest schedule of cosmonauts (Nekotorye voprosy ratsionalizatsii rezhimov truda i otdykha kosmonavtov).** A. Ia. Frolov, A. N. Litsov, V. N. Maliugin, V. A. Sutormin, and I. F. Saraev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 222-233. In Russian.

It is noted that time is often lost in the early part of a flight as cosmonauts adjust physically to conditions of weightlessness. In seeking to make this time up, use is made of the time allotted for rest and sleep, thereby bringing on fatigue. In scheduling the activities of cosmonauts, it is pointed out that consideration should be given to biorhythms and to the psychophysiological structure of the activity that the cosmonauts are called upon to perform. C.R.

**A82-16725 † The activity of psychic models of hypogravity during 30-day experiments (Aktivnost' psikhicheskikh modelei gipovesomosti tela v tridtsatisutochnykh eksperimentakm).** L. P. Grimak. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 233-239. In Russian.

Experiments are described that seek to determine the length of time that a hypnotically induced feeling of hypogravity can persist. During the experiment, the subjects perform functions similar to those that would be performed during a flight. C.R.

**A82-16726 † Psychophysiological safety control in long-duration space flights (K voprosu psikhofiziologicheskogo obespecheniia bezopasnosti kosmicheskogo poleta bol'shoi prodolzhitel'nosti).** V. S. Mishchenko. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 239-247. In Russian.

The evaluation of psychophysiological stress, an important indicator of cosmonaut work capacity, is discussed in light of the increasing range of tasks to be performed in space flights of increasing duration. An approach to the determination of the dynamics and levels of psychophysiological stresses is considered which is based on qualitative and quantitative expert determinations of such factors as the state of weightlessness adaptation, physiological condition, subjective feelings, complaints, fatigue, exhaustion, sleep quality, work duration, work difficulty and productivity, and the importance of the work-rest cycle to cosmonaut work capacities is emphasized. Results are then presented of an analysis of the psychophysiological stress encountered in a ground-based space flight simulation, and patterns in overall psychophysiological condition as a function of experiment duration are illustrated. A.L.W.

**A82-16727 † The effects of a light blue background on the operator visual analyzer (Vliianie golubogo fona na zritel'nyi analizator operatora).** E. N. Khludeev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 248-251. In Russian.

The use of an illuminated visual field to improve operator performance in the detection and tracking of a manned spacecraft or orbital station against the background of the starry sky is studied. Experiments to assess operator performance, comfort and fatigue during an observation task were made under normal conditions, with stars and spacecraft against a black background, and with stars and spacecraft seen against a light blue background to improve visual resolution and prevent fatigue, with operators experiencing post-hypnotic suggestions of weightlessness, hypergravity, stresses and mental stimulation. The probability of detecting the moving spacecraft against the light blue background is found to be significantly greater than that of detecting it against the dark background, particularly in the presence of a time limit under all the experimental conditions. The subjects also reported less fatigue when searching for the object against the illuminated background. Results thus demonstrate the usefulness of visual field illumination in spacecraft detection against a background of stars. A.L.W.

**A82-16801 † The effects of hyperventilation on EEG alpha-rhythm depression induced by a suggested visual representation (Vliianie giperventiliatsii na depressiiu alpha-ritma EEG, vyzvannuiu vnushennym zritel'nym predstavleniem).** R. D. Shmel'kina (Ukrainskii Institut Usovershenstvovaniia Vrachei, Kharkov, Ukrainian SSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 81, no. 9, 1981, p. 1379-1381. In Russian.

**A82-16802 † The effects of immobilization stress on diacyl and plasmogenic phospholipids in various organs and tissues of the rat (Vliianie immobilizatsionnogo stressa na diatsil'nye i plazmalogennye formy fosfolipidov v razlichnykh organakh i tkaniakh krys).** V. M. Dembitskii (Cheliabinskii Gosudarstvennyi Universitet, Chelyabinsk, USSR) and V. E. Riabinin (Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Sept.-Oct. 1981, p. 698-701. 21 refs. In Russian.

**A82-16803 † Extra-erythrocytic hemoglobin and iron-bearing hemoglobin destruction products - A system for the amplification of the toxic effects of hyperoxia (Vneeritrotsitarnyi gemoglobin i zhelezosoderzhashchie produkty destruktsii gemoglobina - Sistema usileniia toksicheskogo effekta giperoksii).** A. I. Lukash and V. V. Vnukov (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Sept.-Oct. 1981, p. 616-618. 12 refs. In Russian.

**A82-16804 † Trial of an automated EKG analysis system in a cardiological clinic (Opyt ispytaniia sistemy avtomatizirovannogo analiza EKG v kardiologicheskoi klinike).** S. L. Korsakas, A. A. Kirmonas, L. I. Gargasas, A. L. Vainoras, L. I. Kalashaitite, A. I. Astrauskas, and P. V. Zabela (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 109-112. 16 refs. In Russian.

Results are presented of a clinical trial of a computerized system for EKG evaluation in cardiac patients. The system, based on the ES-1022 computer, includes an automated electrocardiograph for the acquisition and recording of EKG signals and data input and output systems, as well as programs for input, identification, measurement, rhythm determination, contour analysis, file formation, search and overall regulation. Computer diagnoses of patients with various types of disrhythmias and cardiac pathologies including ischemia and ventricular hypertrophy made by the system as a whole are found to be in agreement with physician diagnoses in 82% of the cases. When the results of both diagnoses are compared with anatomical, clinical and X-ray data, however, the computer results are shown to be little inferior to those of the physicians in terms of either sensitivity or specificity. It is thus proposed that the computer system be incorporated into medical practice. A.L.W.

**A82-16805 † The ergometric determination of myocardial reserves (Opredelenie miokardial'nogo rezerva pri ergometrii).** V. P. Pomerantsev, Iu. S. Mdinaradze, E. A. Prokhorovich, and Iu. A. Vasiuk (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 68-72. 11 refs. In Russian.

An analysis is presented of possible methods for the assessment of myocardial reserves, expressing myocardial capacity for increased cardiac ejection and an indicator of myocardial ischemia, based on the use of ergometric indicators. The methods considered involve various indirect determinations of myocardial reserves by measurements of systolic arterial pressure, heart rate and electrocardiograms during physical loading to derive the heart minute volume and stroke volume. Clinical studies are presented which have demonstrated the correlation of changes in these indicators during exercise with the degree of cardiac insufficiency in patients with post-infarction cardiosclerosis and hypertension. A procedure for the evaluation of myocardial reserves in symptomless patients is then suggested. A.L.W.

**A82-16806 †** **Experience with the development and application of telemetric computing systems in cardiology (Opyt razrabotki i primeneniia telemetricheskikh vychislitel'nykh sistem v kardiologii).** Zh. V. Chepaitis, E. I. Raugalas, A. I. Matuzonis, B. G. Shlapikene, and D. V. Lukshene (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 112-115. 5 refs. In Russian.

A specialized telemetric computing system has been developed for applications in the mass screening of limited populations and the intensive monitoring of patients for signs of ischemic heart disease. The system is composed of an EKG monitoring subsystem, an automatic EKG analysis subsystem and a graphical data processing subsystem acting as an auxiliary to the first two subsystems, all of which exchange information through a common data base developed for the storage of the monitoring data. Experience has shown that, with the proper methodological approach, the use of automatic computing systems has decisive advantages over traditional diagnostic and monitoring methods in certain applications requiring the analysis of massive amounts of data. A.L.W.

**A82-16807 †** **Possible model representations of the neurophysiological mechanisms for the analysis of the direction and speed of a moving visual object (Vozmozhnye model'nye predstavleniia o neirofiziologicheskikh mekhanizmakh analiza napravleniia i skorosti dvizheniia zritel'nogo ob'ekta).** Iu. P. Aleinikov, T. V. Aleinikova, and T. V. Mel'kovskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1201-1207. 8 refs. In Russian.

Models of the detection of the direction and speed of the motion of a visual object at the level of the visual tectum of frogs are examined in order to clarify the possible neurophysiological mechanisms of motion parameter extraction from initially undifferentiated retinal signals. The models rely on the interactions of excitatory and inhibitory synapses on neurons forming part of the visual motion analyzer which are excited by ganglioretinal cells responsive to motion in different directions or at different speeds. In contrast to the two separate models developed, it is emphasized that in the actual tectum, motion direction and speed analyses are apparently performed by the same neurons. A.L.W.

**A82-16808 †** **The age characteristics of physical thermoregulation (Vozrastnye osobennosti fizicheskoi termoreguliatsii).** V. I. Basakin (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 940-942. In Russian.

The thermoregulatory efficiencies of persons of different ages and sexes are evaluated. Skin temperatures over various parts of the body and the response of forearm temperature to local cooling were determined for male and female subjects aged from 1 to 90 years. An inverse relationship is found between subject skin temperature on the forehead, chest, shoulder, forearm and foot and subject age. Women in the 8-12, 18-25, and 36-60 age groups are observed to have higher skin temperatures than the men of the corresponding age groups, while in the remaining groups no sex difference is evident. Trunk-extremity temperature gradients are found to be less pronounced in children than in older age groups. The time required for the reestablishment of original skin temperature following local cooling is also observed to be shorter in the younger people than in the old, and in women from 12 to 60 than in men of the same age. The results may be explained in terms of the activation of the sympathetic nervous system by thyroid activity. A.L.W.

**A82-16809 †** **A procedure for the measurement of the critical flicker fusion frequency (Metodika izmereniia kriticheskoi chastoty sliianiia mel'kanii).** V. A. Gavrilov (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 947-949. 5 refs. In Russian.

A facility is presented which allows the measurement of critical flicker fusion frequency in humans with a greater accuracy than previously achieved. The system comprises a control unit, response circuit, flicker generation circuit including sawtooth voltage generator, voltage-frequency transformer and power amplifier, measurement circuit and optical system. As the system is not based on a mechanical light generation circuit, measurement error associated with system inertness and the shutter activation is eliminated. The use of an operational amplifier allows a high degree of linearity in frequency changes, with frequency error less than 0.06 Hz and measurement error less than 0.1%. In addition, the rate of change of flicker frequency can be adjusted from 0.5 to 1 Hz/sec in the range 10 to 80 Hz. A.L.W.

**A82-16810 †** **The reorganization of EEG structure during adaptation to the Antarctic (Perestroiki struktury EEG, v protsesse adaptatsii v Antarktide).** S. I. Soroko (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 909-916. 23 refs. In Russian.

Changes in the internal structure of brain biorhythmics as revealed by the statistical structure of EEG rhythm interactions during the process of adaptation to Antarctic conditions are investigated. Electroencephalograms were obtained with eyes open and eyes closed in 122 polar workers during the 17th Soviet Antacrtic expedition, and compared with evaluations of nervous system adaptability made on the basis of tests of the plasticity of individual cerebral neurodynamic processes. Results show a shift of the EEG frequency spectra towards lower frequencies as well as substantial rearrangements in the interconnections between the separate rhythms during adaptation. In persons showing a high level of adaptability, the ultimate EEG pattern developed is characterized by a significant strengthening of the statistical relations of the individual rhythms with the alpha and theta rhythms, and an increase in the interrelationship between the successive waves within those rhythms. In persons showing low adaptability, a new EEG pattern is not formed, and a marked instability of the statistical relations of the EEG rhythms is observed. The expression of neurotic states is found to be accompanied by a specific EEG pattern with a functional core in the theta-rhythm region. A.L.W.

**A82-16811 †** **Investigation of physiological compensation processes following the surgical destruction of the labyrinth (Issledovanie protsessov kompensatsii funktsii organizma posle khirurgicheskoi destruktsii labirinta).** V. T. Pal'chun, G. I. Gorgiladze, M. I. Kadymova, and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Sept.-Oct. 1981, p. 7-12. 10 refs. In Russian.

The development and stability of processes in the central nervous system arising as compensation for the unilateral surgical destruction of the labyrinth are studied. Evaluations of equilibrium stability during walking and in the Romberg position, spontaneous and positional nystagmus and the response of the intact labyrinth to caloric and electrical stimulation were made up to 2 years following labyrinthectomy in patients suffering from Meniere's disease and limited labyrinthitis. A relatively rapid development of compensatory processes is observed in the sensory and vegetative functions, while spontaneous falling nystagmus and asymmetrical muscle tone persist for at least two years. The elimination of visual fixation, as well as mental work, changes in otolith orientation and alcohol intoxication, are found to facilitate vestibular asymmetry. Patient nystagmus and responses to cold stimulation during the first week after surgery indicate the rapid development of central nervous system compensation. Results support labyrinthectomy as the method of choice in the treatment of unilateral peripheral disorders of the vestibular apparatus combined with a high degree of amblyacousia. A.L.W.

**A82-16812 †** **Investigation of the otolith apparatus in clinical practice (Issledovanie otolitovogo apparata v klinicheskoi praktike).** A. O. Radzhabov and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Sept.-Oct.

1981, p. 79-82. 56 refs. In Russian.

Clinical investigations of otolith functions are reviewed to illustrate the methods currently available for clinical application. Attention is given to uses of eyeball counterrotation as an indicator of otolith function, with emphasis of the Fischer method of visual afterimages, methods based on the influence of the otolith on postrotation reflexes, including the otolith reaction method with a rotating chair, and utricular and saccular gaits, the use of graded inclinations to determine otolith sensory thresholds, a standing task on a low bar to assess equilibrium functions, posturography, and four-bar swings. The Fischer method of indirect otolithometry and the use of small-amplitude stimulation on parallel four-bar swings for direct otolithometry are recommended as appropriate for use in clinical practice. A.L.W.

**A82-16813** † **The differential diagnosis of on asymmetrical trend in vestibular responses in peripheral and central hemispheric lesions (Differentsial'naia diagnostika asimmetrichnogo techeniia vestibuliarnykh reaktsii pri perifericheskom i tsentral'nom polusharnom porazheniiakh).** N. S. Blagoveshchenskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* Seot.-Oct. 1981, p. 3-7. 20 refs. In Russian.

Methods allowing the detection and differential diagnosis of vestibular asymmetries of peripheral and central hemispheric origin are presented. The methods involve the monitoring of nystagmic reaction to application of caloric stimuli to each ear, exposure to graded levels of relatively low-intensity rotation, or a combination of rotatory and caloric stimulation. It is noted that the most marked hemispheric asymmetries appear in deep subcortical foci in the temporo-parieto-frontal region during the decompensation phase, giving rise to a strengthening of nystagmus towards the focus. It is also pointed out that the predominant direction of nystagmus in hemispherical asymmetries may vary with the course of the disease and with the vestibular stimulus applied. A.L.W.

**A82-16814** † **The response of the hematic system of adrenalectomized mice to stressor activity (Reaktsiia sistemy krovi adrenalektomirovannykh myshei na stressornoe vozdeistvie).** ?. D. Gorizontov, M. I. Fedotova, and L. N. Egorova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 36-39. 7 refs. In Russian.

Mechanisms leading to the changes observed in the hematic system in the two days following a single exposure to stress are investigated in a study of the response of adrenalectomized mice to a 6-hr immobilization. The cellular composition of the peripheral blood, bone marrow cell populations and amounts of karyocytes in the spleen and thymus were determined periodically following the immobilization on their backs of 170 adrenalectomized and 110 sham-operated mice. Whereas the peripheral levels of neutrophilic granulocytes initially rose then returned to their original values in both groups of animals, lymphocyte numbers are observed to increase following immobilization in the adrenalectomized mice and decrease in the controls. Bone marrow populations of lymphoid cells, neutrophilic granulocytes and mature neutrophilic cells are observed to undergo variations typical of the stress reaction in adrenalectomized and control animals alike, although the stem cells in the bone marrow of the experimental animals failed to increase and in fact decreased during the period of observation. Whereas the characteristic diminution in spleen cells is observed in both groups, the increase in thymus cells is much less marked in the adrenalectomized than in the control mice. Results thus demonstrate that changes in only peripheral blood lymphocyte numbers, thymus cell numbers and bone marrow stem cell numbers depend on the adrenal hormones. A.L.W.

**A82-16815** † **The effects of immobilization on the development of experimental atherosclerosis in rabbits (Vliianie immobilizatsii na razvitie eksperimental'nogo ateroskleroza u krolikov).** G. P. Deriagina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and T. A. Sinitsyna (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 32-36. 17 refs. In Russian.

**A82-16816** † **Changes in Hageman factor system indicators during human adaptation to intense physical loading (Izmeneniia pokazatelei 'sistemy faktora Khagemana' pri adaptatsii cheloveka k intensivnoi fizicheskoi nagruzke).** A. M. Chernukh, O. A. Gomazkov, N. V. Komissarova, L. A. Lantsberg, and N. M. Shkol'nik (Akademiia Meditsinskikh Nauk SSSR; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 25-28. 6 refs. In Russian.

Changes in the blood kallikrein-kinin, thrombin and plasmin systems, which collectively make up the Hageman factor system (HFS), accompanying intensive physical training are investigated. Precursors and inhibitors of kallikrein, thrombin and plasmin were determined in blood taken at rest and following maximal bicycle ergometer exercise from untrained healthy men, athletes during a period of intensive training and preparation for competition, and athletes following the end of the competitive season. Levels of the three precursors and of the plasmin and thrombin inhibitors are found to be higher in the training athletes than in either the controls or the recovering athletes, while the kallikrein inhibitor values are lower. Short-duration maximal exercise is observed to lead to increases in precursor levels and decreases in inhibitor levels in the controls and nontraining athletes, and decreases in all indicators with the exception of the plasmin inhibitor in active athletes. Results demonstrate the diagnostic and prognostic value of HFS determinations in the norm, in various cardiovascular pathologies, and during adaptation to prolonged physical loads. A.L.W.

**A82-16817** † **Biogenic monoamine concentrations in autonomic nervous system ganglia during acute experimental emotional stress (Soderzhanie biogennykh monoaminov v uzlakh avtonomnoi nerunoi sistemy krolika pri ostrom eksperimental'nom emotsional'nom stresse).** V. V. Portugalov, N. V. Petrova, S. I. Kashtanov, and B. N. Manukhin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 28-32. 18 refs. In Russian.

**A82-16818** † **A modified kinetic model of muscular contraction (Modifitsirovannaia kineticheskaia model' myshechnogo sokrashcheniia).** E. M. Timanin (Akademiia Nauk SSSR, Institut Prikladnoi Fiziki, Gorki, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 915, 916. 8 refs. In Russian.

A modification of the kinetic model of the interaction of contractile proteins of Deshcherevskii (1977) is presented which may be used in the construction of a set of models describing the entire process of muscular contraction. The present model takes into account the effects of the blockage of actin centers by troponin, and may be used to describe the growth and relaxation of muscular tension. In the limit of complete activation (troponin derepression) by Ca(2+) ions, it becomes identical to that of Deshcherevskii. A.L.W.

**A82-16819** † **Analysis of retinal work in the discrimination of a contour signal (Analiz raboty setchatki, vydeliaiushchei konturnyi signal).** D. G. Lebedev (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 860-863. In Russian.

A comparative analysis is presented of the construction of the finite-difference Laplacian of the initial illumination distribution of light-sensitive retinal receptors by a mechanism based on lateral inhibition and according to the drift of the visual axis of the eye. Models of object shape discrimination by both mechanisms are developed taking into account the spread in the characteristics of the visual receptors and other retinal components observed in the eye itself. It is shown that whereas the lateral inhibition mechanism is much simpler, the visual axis drift mechanism, as used in models of the human visual system, provides a means of suppressing output signal noise caused by retinal element nonuniformities. A.L.W.

**A82-16820** † **Model for the perception of moving and fixed objects (Model' vospriiatiia dvizhushchikhsia i nepodvizhnykh ob'ektov).** I. S. Losev and T. M. Shura-Bura (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSP). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 854-859. 9 refs. In Russian.

A two-dimensional model is developed and examined which reproduces phenomena connected with the visual perception of objects moving and fixed with respect to the retina. The model comprises a set of operations, including a logarithmic operation, smoothed differentiation with respect to time, spatial discrimination and reduction, to represent the sensation produced by an initial distribution of illumination on the retina as a function of time. Among the phenomena accounted for by the model are the generation of the empty field, the maintenance of normal vision during ocular drift, the comet phenomenon, changes in perceived brightness upon the stabilization of object sector boundaries, the perception of objects undergoing short-periodic oscillations and the perception of a continuously varying brightness distribution. The model is used to make theoretical predictions concerning some of these phenomena. A.L.W.

**A82-16821** † **Prevention of hypoxic heart damage by the use of oxypyridine-class antioxidants (Preduprezhdenie gipoksicheskogo povrezhdeniia serdtsa s pomoshch'iu antioksidanta iz klassa oksipiridinov).** F. Z. Meerson, N. A. Abdikaliev, and L. Iu. Golubeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 281-283. 11 refs. In Russian.

**A82-16822** † **Damage and repair of heart muscle DNA during emotional-pain stress (Povrezhdenie i reparatsiia DNK serdechnoi myshtsy pri emotsional'no-bolevom stresse).** F. Z. Meerson and V. K. Vasil'ev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 297-299. 12 refs. In Russian.

**A82-16823** † **The functional state of some subcortical cerebral structures during adaptation and deadaptation to physical loading (Funktsional'noe sostoianie nekotorykh podkorkovykh struktur mozga pri adaptatsii i deadaptatsii k fizicheskoi nagruzke).** V. M. Boev (Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 271-273. 13 refs. In Russian.

Changes in the functional condition of deep structures in the brain during the prolonged adaptation and deadaptation of rabbits to physical loading are investigated. Chronically implanted bipolar electrodes were used to monitor the local blood flow and excitability of the dorsal hippocampus, reticular formation of the midbrain, ventromedial hypothalamic nuclei and thalamic caudate and anteromedial nuclei in rabbits during a 120-day training period of submaximal and maximal treadwheel running and the 30-day period following the cessation of training. Initial periodic variations in the functional activity of all the structures studied with the exception of the hypothalamus are observed to stabilize at either enhanced or reduced levels by the 20th day of training, indicative of an adaptive response to submaximal physical loading. Exercise to the limit is observed to induce changes in the activities of the dorsal hippocampus, hypothalamus and particularly the reticular formation. The earliest stages of deadaptation are characterized by reductions in dorsal hippocampus and hypothalamic excitability, while reticular formation excitability is reduced to its original level only on the 30th day after the completion of training. A.L.W.

**A82-16824** † **Morphology of experimental pneumoconiosis arising from the effects of lunar soil (Morfologiia eksperimental'nogo pnevmokonioza, razvivaiushchegosia pod vozdeistviem lunnogo grunta).** Iu. D. Batsura, G. G. Kruglikov, and V. D. Arutiunov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 376-379. 5 refs. In Russian.

The morphological effects of the inspiration of lunar soil particles are examined in an electron microscopic study. Pneumoconiosis was induced in albino rats by the intratracheal introduction of a suspension of finely dispersed lunar soil (brought back by Luna-16 from Mare Foecunditatis) in a starch solution; lung and trachoebronchial morphologies and phagocytitic activity were assessed after 3 days, 3 months and 6 months. Lung pathologies are observed to develop by an inflammatory response characterized by intense leucocyte and macrophage responses in the early stages, and, in later stages the thickening of the basal layer of the blood-air barrier, the activation of fibroblasts, cell associations and fibrosis, and the blockage of the terminal sections of the lymphatic system in response to the passage of 0.5-micron particles. The degree of fibrosis is found to be on the order of that associated with the weakly fibrogenic dusts. A.L.W.

**A82-16825** † **The effects of heat stress on the morphogenetic potencies of the nephron epithelium (Vliianie teplovogo stressa na morfogeneticheskie potentsii epiteliia nefrona).** O. Z. Mkrtchan (Tiumenskii Gosudarstvennyi Universitet; Tiumenskii Meditsinskii Institut, Tyumen, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 352-356. 11 refs. In Russian.

The effects of heat traumas on the proliferation, growth and differentiation of the rat nephron epithelium are investigated in cultures grown within the organism. Sections of decapsulated kidneys taken from 6-month-old rats exposed to a heat stress of 45 C for 60 min and from control rats were implanted under the skin of the abdominal wall of recipient 2-month-old rats, and the implants were extirpated periodically for up to 30 days following implantation. The heat stress is observed to lead to a deterioration in kidney hemodynamics, associated with an increase in vascular permeability, ischemia of the cortical juxtamedullar zone and distrophic changes in the proximal and distal nephron sections. In both the healthy and experimental implanted kidneys, a vascular-tissue reaction is observed to take place, leading to the formation of connective capsules, intercelloidin layers and vessels in the implant. In comparison to the control implant, however, the experimental implant is found to exhibit intensified proximal and capsular destruction and a prolonged period of proliferative growth. The method employed is concluded to be useful for the development of objective criteria for the effects of extremal factors on tissue and organ properties.
A.L.W.

**A82-16830** * **Effects of disuse by limb immobilization on different muscle fiber types.** F. W. Booth, M. J. Seider (Texas, University, Houston, TX), and G. R. Hugman (Baylor University, Houston, TX). In: Plasticity of muscle. Berlin, Walter de Gruyter und Co., 1980, p. 373-383. 33 refs. Grant No. NIH-AM-19393; Contract No. NAS9-15388.

The effects of disuse by limb immobilization on different muscle fiber types are reviewed. It is demonstrated that many changes occurring in atrophying skeletal muscles of young rats can be explained by the duration of the half-lives of muscle proteins. Differences are found to exist in responses of fast- and slow-twitch muscles due to disuse atrophy, and the appearance of plasticity in skeletal muscle begins to occur very soon after changes in the level of contractile activity. Rates of protein degradation increase in slow-twitch muscles at rapidly growing rates after approximately one day of limb immobilization; however, no change in the rates of protein degradation is noted in fast-twitch muscles of young rats. D.L.G.

**A82-16833** * **Reissner's membrane and the spiral ligament in normal rats and those treated with ethacrynic acid.** M. D. Ross. In: Ménière's disease: Pathogenesis, diagnosis and treatment; Proceedings of the International Symposium, Düsseldorf, West Germany, May 1980. Stuttgart, Georg Thieme Verlag; New York, Thieme-Stratton, Inc., 1981, p. 76-86. 38 refs. Grants No. NsG-9047; No. NIH-NS-13428.

A description is presented of recent ultrastructural findings in Reissner's membrane and the spiral ligament in rats treated daily with ethacrynic acid during the 2nd and 3rd weeks of postnatal life, a period of final maturation of the inner ear and its fluids. A distension of Reissner's membrane in every cochlear turn, indicative of mild endolymphatic hydrops, was found to occur in animals that received a higher dose of ethacrynic acid. Ultrastructurally, the cytoplasm of the epithelial cells of Reissner's membrane showed increased electron density after treatment with ethacrynic acid. This increase was most pronounced in animals treated with a greater quantity of the drug. The epithelial cells had similar ultracellular features throughout except that the cells were much thinner in the region of maximal distension. G.R.

**A82-16892** **Principles of feature integration in visual perception.** W. Prinzmetal (British Columbia, University, Vancouver, Canada). *Perception and Psychophysics,* vol. 30, no. 4, Oct. 1981, p. 330-340. 22 refs. Natural Sciences and Engineering Research Council of Canada Grant No. A-7039.

The results of four experiments using conjunction errors to determine principles which could predict which features of a stimulus display are integrated by the visual system are presented. Specific attention was given to the location principle, to see if features located close together in space would be joined, and the perceptual group principle, to observe if the visual system would join features from stimulus items forming the same perceptual group or pattern. Subjects were presented tachistoscopic displays of two rows of circles and were asked to determine if there had been a 'plus' sign present in one of the circles. The rows were varied in orientation in space and to one another, and also in color. The perceptual group principle was found to be a good predictor of feature recognition, whereas the location principle was not. Further studies to determine if perceptual organization affects feature abstractions as well as feature integration are indicated. M.S.K.

**A82-16893** **Is recognition accuracy really impaired when the target is repeated in the display.** C. W. Eriksen, N. Morris, Y.-Y. Yeh, W. O'Hara, and R. T. Durst (Illinois, University, Urbana, IL). *Perception and Psychophysics,* vol. 30, no. 4, Oct. 1981, p. 375-385. 25 refs. Grant No. PHS-MH-01206.

Bjork and Murray (1977) have presented a feature-specific interactive channels model that predicts perceptual interference between letters presented simultaneously in visual displays. Maximum interference is predicted when a target letter is presented with an identical letter. In their experiment, Bjork and Murray found support for their model, but their results could have occurred artifactually from response biases of their subjects. Santee and Egeth (1980) used a different paradigm that eliminated the possibility of this particular response bias and reported that their data supported the feature-specific model. However, the present paper shows that analysis of their data by Santee and Egeth was incomplete and the comparisons inappropriate. In two experiments that used the Santee and Egeth paradigm, support was not found for the feature-specific model when more detailed analyses of the data were undertaken. In a third experiment, one that used the Bjork and Murray paradigm, but with control of response bias, no significant or suggestive evidence was found that feature similarity between noise and target letters affected recognition of the latter. (Author)

**A82-16926** **Basic environmental problems of man in space; Proceedings of the Sixth International Symposium, Bonn, West Germany, November 3-6, 1980.** Symposium sponsored by the International Academy of Astronautics. Edited by K. E. Klein and J. R. Hordinsky (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *Acta Astronautica,* vol. 8, Sept.-Oct. 1981. 298 p.

Summaries were given of biomedical research on manned and biosatellite spacecraft from the U.S. and U.S.S.R. Papers were presented on investigations of the effects of spaceflight on human cardiovascular and pulmonary systems. Attention was also paid to studies involving endocrinology, hematology, and immunology, as well as neurology and psychology in spaceflight, with emphasis on the causes and prevention of space sickness. Changes worked on the human musculoskeletal system by hypogravity, hypokinesia, and long duration spaceflight are examined, and preventive health maintenance and medical care in spaceflight are considered. The calcium loss mechanism was explored, and biotechnology for emergency and rescue conditions and trends in life support equipment are reviewed. Finally, future missions for U.S. and U.S.S.R. space activities are outlined. M.S.K.

**A82-16927** * **U.S. manned space flight: The first twenty years - A biomedical status report.** L. F. Dietlein (NASA, Johnson Space Center, Houston, TX) and R. S. Johnston (Texas, University, Houston, TX). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 893-906. 5 refs.

In the last 20 years, the biomedical problems facing man in space have been brought into sharper focus. Space motion sickness is presently the most serious problem. Its etiology remains obscure, but the 'sensory conflict' theory appears most plausible. No valid predictive tests of susceptibility exist and presently medication for prevention or mitigation of symptoms must be relied on. Adaptation/biofeedback techniques may prove useful. Cardiovascular 'deconditioning' may be effectively attenuated by use of anti-g suits or plasma expanding techniques. Recent bedrest simulation studies would seem to indicate that concerns about chronically elevated central venous pressure during space flight are unfounded. The loss of red cell mass in space flight appears to be self-limited, independent of mission duration, and not of clinical concern, based on recent Soviet experiences. And finally, clodronate, a new diphosphonate effective in preventing hypercalciuria and negative calcium balance in normal human bedrested subjects, may prove effective in preventing or lessening skeletal mineral loss in space. (Author)

**A82-16928** **Summary of medical investigations in the U.S.S.R. manned space missions.** O. G. Gazenko, A. M. Genin, and A. D. Egorov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 907-917. 6 refs.

Russian medical investigations of the effects of spaceflight on human physiology are reported. Short duration flights at the beginning of the Russian space program revealed vestibulo-autonomic disorders due to weightlessness and deconditioning to work loads and earth gravity. Vestibulo-autonomic disorders were found to recur among 30% of the cosmonauts once longer spaceflights were undertaken. Pulse blood filling of the head persisted for 3-4 months of flight, yet decreased in the legs, and oxygen debt grew as a function of flight length. Hypertrophy of the leg muscles and the long wide back and neck muscles occurred from the absence of gravity, slowing only when countered with vigorous exercise programs. All changes, even after the 175-day flight, were seen to be reversible after varying periods of time back on earth, although it is noted that even longer flights may result in social-psychological problems which are not yet predictable. M.S.K.

**A82-16929** **Summary of experiments onboard Soviet biosatellites.** S. O. Nikolaev and E. A. Il'in (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 919-926. 54 refs.

Physiological, morphological and biochemical studies of mammals flown on board biosatellites of the Cosmos series revealed changes in their cardiovascular, musculoskeletal, endocrine and vestibular systems. Space flight resulted in moderate stress reactions, intralabyrinthine conflict information during movements, and changes in fluid-electrolyte metabolism. Exposure to artificial gravity (1 g) decreased the level of myocardial, musculoskeletal and excretory changes, but disturbed the function of equilibrium. Studies with combined weightlessness and ionizing radiation demonstrated that weightlessness did not produce a significant modifying effect on radiation damage and postradiation recovery. Consistent changes in certain systems of animals and humans in weightlessness confirm the practical importance of biosatellite studies, which also contribute to the solution of general biology problems associated with gravity effects on life processes. (Author)

**A82-16930** * **U.S. biological experiments in space.** H. P. Klein (NASA, Ames Research Center, Moffett Field, CA). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 927-938. 68 refs.

The history of biologic experimentation in space is traced. Early balloon and rocket borne animals showed no abnormalities on the macroscale, and biosatellite launches with bacteria and amoebae revealed no microscopic dysfunctions. Adult Drosophila flies on board Cosmos spacecraft died with a shortened lifespan, while their offspring lived full lifespans. Green pepper plants grown in weightlessness showed a different orientation, but no physiological disturbances. Normal bone growth in rats has been found to almost cease after 11 days in space, and the mean life span of red blood cells decreases by four days. A series of experiments designed by U.S. scientists will be performed on primates provided and flown by the U.S.S.R. Finally, experiments on board Spacelab will involve determination of the persistence of circadian rhythms in bacteria and humans. M.S.K.

**A82-16931** **Current views and future programs in cardiovascular physiology in space.** K. A. Kirsch and H. von Ameln (Berlin, Freie Universität, Berlin, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 939-950. 20 refs. Research supported by the Bundesministerium für Forschung und Technologie.

The volume shift of 2000 cu cm from the lower to the upper part of the human body during weightlessness gave rise to theoretical and practical questions which are addressed in this communication. The analysis revealed that the mobilized fluid reduced the interstitial fluid of the lower extremities by 40%. Applying the current ideas in the field of interstitial tissue physiology to these problems, one must conclude that the fluid displacement can only be brought about by a change of the interstitial tissue compliance. Based on the observations made by the astronauts and on the working hypothesis of the authors, a method was proposed to follow the fluid migration and to measure the tissue compliance in man. Results are reported from experiments under terrestrial conditions. They show that the tissue compliance indeed can be modulated. Applying the method in space can eventually help to clarify several concepts in terrestrial physiology. (Author)

**A82-16932** **Cardiovascular reflexes during rest and exercise modified by gravitational stresses.** F. Bonde-Petersen (Copenhagen, Universitet, Copenhagen, Denmark). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 951-958. 10 refs. Research supported by the Danish Space Council and Statens Laegevidenskabelige Forskningsrad.

The effects of negative and positive pressure during rest and exercise were studied to determine whether variations in central venous pressure via the low pressure baroreceptors modifies the arterial baroreceptor function. Seven males in supine position were measured by an Xe-133 washout technique, revealing that increased sympathetic nervous activity of central origin overrides the local veno-arterial reflex. The subjects also underwent hand-grip exercise in a pressure tank or an anti-g suit and were monitored for cardiac output, forearm blood flow, blood pressure, heart rate, total peripheral resistance, and stroke volume. Two regulatory mechanisms were found for skin blood flow, one a veno-arteriolar local reflex mechanism and one in the central nervous system, implying that hydrostatic skin pressure and global vasoconstrictor tone attenuates hydrostatic pressure effects on capillary pressure. Prolonged exercise time was achieved in 35 C water as a result of enhanced venous return because venous pooling due to gravity was avoided. M.S.K.

**A82-16933** **Effect of physical fitness and training on physiological responses to hypogravity.** H. Saiki, M. Nakaya, M. Sudoh, M. Abe, Y. Taketomi, K. Oh'ishi (Jikei University, Tokyo, Japan), Y. Saiki, and A. Saiki (Saiki Institute of Science for Nutrition, Tokyo, Japan). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 959-969. 12 refs.

Athletes, quasi-athletes, and nonathletes were studied after periodic exercise and immersion in a water tank to determine the effects of hypogravity on physical fitness. Changes in VO2 flux, anaerobic power and flicker fusion value, blood pressure and pulse rate, urinary excretion of K(+), Na(+), 17-OHCS, and catecholamines were measured every hour for six hours. Orthostatic tolerance (OST) increased after exercise and decreased after immersion. An observed increase in pressure regulation functions was taken as an adaptation to the decrease in tolerance of other functions, creating a favorable condition for hypodynamic life. Water immersion helped the recovery of tolerance losses and did not create stress. However, a relatively small noradrenaline decrease, and a smaller adrenaline increase, were taken as evidence of detrimental effects of hypodynamics for athletes. M.S.K.

**A82-16934** **Simulation of human reactions under extreme conditions.** H. Felkel, M. Jirina, M. Adamec, R. Feuereisl, J. Dvorak, and L. Cettl (Vyzkumny Ustav Tuberkulozy a Respiracnich Nemoci, Prague, Czechoslovakia). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 971-976.

A heuristic model of the lung flow-volume loop for lung mass determination is presented. The redistribution and transfer of fluids in weightlessness affects lung blood flow, and computer analysis and simulation was used to mathematically describe breathing dynamics. Second order parameters were identified and model calculations were compared to results derived from esophageal sounds made by 20 random individuals. A correlation of 0.803 was found, and in-flight measurement of the relative blood volume in the lungs in weightlessness is projected to be possible using a pneumotachograph. M.S.K.

**A82-16935** * **An overview of the endocrine and metabolic changes in manned space flight.** C. S. Leach (NASA, Johnson Space Center, Biomedical Laboratories, Houston, TX). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 977-986. 31 refs.

Analyses of endocrinological and metabolic data from humans during spaceflight, particularly the Skylab crews, are summarized to define the levels of knowledge of these processes and the techniques for studying them. The glomerular filtration rate was tested by urine and blood samples, yielding indications of a creatinine clearance increase. The mechanisms for an increase of free water clearance, implying an increase of antidiuretic hormone, are uncertain, and tests are also under way to evaluate the role of prostaglandins in-flight, to account for decreases in catecholamine excretion. Bone mineral losses of 7.9% were observed at the end of 84 days, and processes are suggested for the calcium metabolism. Finally, the observation of almost universal weight loss among space crewmembers is examined, and a loss of muscle tone due to decreased metabolic efficiency is cited as a feature of long duration spaceflight. M.S.K.

**A82-16936** **Ion regulatory function of the human kidney in prolonged space flights.** A. I. Grigor'ev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 987-993. 14 refs.

Ten cosmonauts, who performed 30-175-day space flights aboard Salyut-4 and Salyut-6, and over 60 test subjects who were exposed to bed rest of up to 182 days and immersion of up to 56 days, were examined. The renal excretion of potassium and calcium increased, reaching a maximum by the 4-6th weeks in prolonged space flights and simulation studies. During the load tests with potassium and calcium salt, excretion postflight was much higher than preflight. During potassium chloride load tests a positive correlation between the blood content of aldosterone and potassium excretion existed, whereas during calcium lactate load tests an increased calcium excretion was accompanied by a decrease in blood parathyroid hormone concentration. The most probable cause of the negative ion balance in weightlessness is the reduced capacity of tissues to retain electrolytes due to the decreased ion pool capacity. Different exercises have been shown to exert a beneficial effect on electrolyte metabolism. (Author)

**A82-16937** **Hematological and immunological changes during space flight.** A. Cogoli (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 995-1002. 28 refs. Swiss National Science Foundation Grant No. 3,449,0,79.

This paper gives a summary of the principal hematological and immunological changes observed in crews after space flight. Reduction of red blood cell mass (2-21%) and of hemoglobin mass (12-33%) is generally observed. The changes are accompanied with a loss of plasma volume (4-16%). Erythrocyte and hemoglobin concentrations in the blood remain constant, suggesting that the changes are driven by a feed-back mechanism. Immunological changes consist mainly of reduced T-lymphocyte reactivity. The results of the 96-day and 140-day Salyut-6 missions suggest that the adaptation of the immune system to spaceflight occurs in two stages: the first takes place during the first 2-3 months in space, the second follows and consists of further weakening of the immune response. Experiments with human lymphocytes in vitro indicate that high-g enhance, whereas low-g depress lymphocyte activity. Finally, investigations to be performed on Spacelab are described. (Author)

**A82-16938** **Nausogenic properties of various dynamic and static force environments.** R. J. von Baumgarten, H. Vogel, and J. R. Kass (Mainz, Universität, Mainz, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1005-1013. 9 refs. Bundesministerium für Forschung und Technologie Contract No. 01-QV-017-ZA/WF/WRK-2755.

Tests to define the exact nature of space sickness are described. Static space sickness is thought to occur in individuals who lack perfect symmetry in their otoliths. Orientation imbalance is then precipitated by a change to a hypogravity field. Dynamic space sickness can happen in persons who are not affected by static space sickness, and involves displacement of the otoliths by inertial forces during head movements and locomotion. Experiments in cars, airplanes, and on a laboratory sled to explore the susceptibility to motion sickness are outlined. It was observed that humans have sensors for acceleration, but not for velocity, and velocity- and hill-top illusions are mentioned, noting that changes in direction or acceleration led to subjects perceiving up and down motions while in fact they were riding in a horizontal path. Symptoms vanished with visual contact with the environment. M.S.K.

**A82-16939 *** **Coping with space motion sickness in Spacelab missions.** A. Graybiel (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1015-1018. 7 refs. NASA Order T-3384-G.

Lessons learned from Skylab are applied to methods of dealing with space sickness among crewmembers in their first orbital flight. Early experiences on Skylab 3 led to regularly scheduled scopalamine/dexedrine tablets ingestion. Subsequent experiences on the next Skylab mission established a 75% incidence of the sickness among first-time-in-orbit crewmembers, notably in periods of inactivity rather than work periods. Intramuscular injections are recommended to treat acute space sickness. Preflight transdermal scopalamine plus three or four doses of 5 mg amphetamine are chosen preventive measures, giving 12 hours of efficacy. M.S.K.

**A82-16940** **Status of vestibular function after prolonged bedrest.** M. Burgeat, M. Toupet, D. Loth, I. Ingster (Hôpital Lariboisière, Paris, France), A. Guell, and J. Coll (Hôpital de Rangueil, Toulouse, France). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1019-1927. 7 refs. Research supported by the Centre National d'Etudes Spatiales.

Six young, healthy, male volunteers were submitted to one week of head down (-4 deg) bedrest. This position simulates the cerebral hemodynamic conditions in weightlessness. Measurements of vestibular equilibrium and of oculomotor system function were made before and after the prolonged bedrest. Analysis of the results indicates that vestibular responses, as measured by the maximal speed of the slow phase of the provoked nystagmus (caloric and sinusoidal rotary stimulations), are decreased after prolonged bedrest. This statistically significant diminution requires confirmation with a greater number of cases. The reflex conflicting or interacting with the cervico-ocular and optokinetic reflexes on the one hand and the foveal vision on the other, is one of several possible explanations for the observed changes. (Author)

**A82-16941** **Vestibular tests in the selection of cosmonauts.** J. Kubiczkowa (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1029-1034. 14 refs.

Results of the testing of cosmonaut candidates for susceptibility to space sickness caused by Coriolis accelerations are reported. The tests comprised biothermal caloric, rotary acceleration-deceleration, optokinetic, swing torsion, and statokinesemetric trials. Nystagmus parameters were obtained from the caloric and rotary tests, and were found similar for subjects with high tolerances for Coriolis accelerations. It is noted that vestibular habituation did not occur evenly for all subjects, and further tests to determine the exact physical mechanisms which lead to reduced response to motion sickness are recommended. M.S.K.

**A82-16942 *** **Effects of the diet on brain function.** J. D. Fernstrom (MIT, Cambridge, MA). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1035-1042. 19 refs. NASA-NIH-PHS-supported research.

The rates of synthesis by brain neurons of the neurotransmitters serotonin, acetylcholine, and the catecholamines depend on the brain levels of the respective precursor molecules. Brain levels of each precursor are influenced by their blood concentration, and for the amino acid precursors, by the blood levels of other amino acids as well. Since diet readily alters blood concentrations of each of these precursors, it thereby also influences the brain formation of their neutrotransmitter products. (Author)

**A82-16943** **Informational need of emotional stress.** P. V. Simonov and M. V. Frolov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1043-1049. 9 refs.

Subjects underwent a series of tests comprising a visual recognition of numbers in the presence of visual noise and time constraints to measure the influence of emotional stress on reactions. Small levels of continued emotional stress were found to increase performance, decrease errors, and also lead the operators to regard unimportant cues as important. A hypothalamus-amygdala model is presented, where motivational conflict induces chronic anxiety and fixed-direction actions. Further personality typing is attempted with models of hypothalamus-frontal cortex dominated individuals, who are predominantly introverts or choleric, and amygdala-hippocampus dominated persons, who are weak or melancholic. Additionally, there are frontal-cortex-hippocampus dominated individuals who display extroverted behavior. M.S.K.

**A82-16944** **How important are changes in body weight for mass perception.** H. E. Ross (Stirling, University, Stirling, Scotland; Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1051-1058. 26 refs.

The ability of humans to judge weight and mass in variable gravity conditions is considered. Subjects have compared weights and masses in and out of water, in parabolic flight and on the ground, and in centrifuges. Differences in the arm weight due to reduced gravity was found to lead to a choice of weights and masses greater than those in normal gravity. Sequencing the magnitude of the objects also displayed significant effects, as did the presence of anxiety, unusual vestibular stimulation, cognitive expectations, and range effects. Adaptation to null gravity results in an improvement in judgment of the mass of familiar objects, called 'mass constancy', and maladjustment returns with a return to a different gravity environment. M.S.K.

**A82-16945** **Pathophysiology of motor functions in prolonged manned space flights.** I. B. Kozlovskaia, Iu. V. Kreidich, V. S. Oganov, and O. P. Koserenko (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1059-1072. 14 refs.

The influence of weightlessness on different parts of the motor system has been studied in crew members of 140- and 175-day space flights. It has been shown that weightlessness affects all parts of the motor system including: (1) the leg and trunk muscles, in which severe atonia, a decrease of strength and an increase of electromyographic cost of contraction have been observed; (2) the proprioceptive elements and the spinal reflex mechanisms in which decreased thresholds accompanied by decreases of maximal amplitude of reflexes and disturbances in cross reflex mechanisms have been found; and (3) the central mechanisms that control characteristics of postural and locomotor activities. The intensities and durations of disturbances of different parts of the motor system did not correlate to each other, but did correlate with prophylactic activity during space flight. The data suggest a different nature of disturbances caused by weightlessness in different parts of the motor system. (Author)

**A82-16946** **The effects of hypokinesia in primates and bone strength.** L. E. Kazarian and H. E. von Gierke (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1075-1082.

A 14 days ground based primate hypokinesia investigation was conducted to determine what changes, if any, in bone strength may be demonstrated following 2 weeks cast immobilization and at 14 days after removal from casts. Controlled compressive loads were applied to vertebral bodies excised from control, 2 weeks immobilization and 2 weeks post immobilization Rhesus monkeys. The material properties reported herein are ultimate load, displacement to ultimate load, stiffness, and energy to ultimate loads. These results show a decrease in bone strength following immobilization and a still further decrease in bone strength after 14 days. (Author)

**A82-16947** **Bone effects of space flight - Analysis by quantum concept of bone remodelling.** A. M. Parfitt (Henry Ford Hospital, Detroit, MI). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1083-1090. 25 refs.

The long term effects and extent of bone calcium loss due to long duration spaceflight are examined. The calcium loss is mainly through urinary excretion, according to Skylab IV data, with a maximum loss rate of 300 mg/day. The total average depletion was 18 g from both trabecular and cortical bones, and the extent of recovery after return to earth is as yet undetermined. Bone remodelling in natural processes involves osteoclast excavation of bone cavities and osteoblast renewal, with complete erosion and repair cycles lasting 3-6 months. An example of deer antler regrowth is cited, wherein increased cortical bone porosity occurs during regrowth, then returns to normal after the antlers are completed. Finally, tetracycline labeling of bone formation sites is reviewed, and it is cautioned that results of studies of bone regrowth for long term bedrest subjects may not be applicable for long term spaceflight. M.S.K.

**A82-16948** **Radiation - Risk and protection in manned space flight.** V. M. Petrov, E. E. Kovalev, and V. A. Sakovich (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1091-1097. 15 refs.

Radiation hazard for cosmonauts and necessary protective measures are considered. The radiation is either permanent, such as in the inner terrestrial radiation belts, or temporary, such as in the fluctuating outer belts, from solar flares, or from cosmic ray showers. An effective level of 33 rem is offered as a justified risk dose, based on U.S.S.R. and international safety standards. Estimated radiation levels are provided for a one year spaceflight, noting that exposures to 50 rem doses should be more than one month apart. Increased orbital inclination, lengthy flight duration, and higher orbits all lead to increased radiation risks, and shielding with aluminum to 5 g/sq cm is recommended, along with a radiation shelter for long term workers on space stations. The calculated permissible dose rates are designed to bring the probabilities of death due to tumors caused by radiation in line with hazards faced in other occupations, such as test pilots. M.S.K.

**A82-16949** **The role of HZE particles in space flight - Results from spaceflight and ground-based experiments.** H. Bücker and R. Facius (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Frankfurt am Main, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1099-1107. 19 refs.

Selected results from experiments investigating the potentially specific radiobiological importance of the cosmic HZE (equals high Z, energetic) particles are discussed. Results from the Biostack space flight experiments, which were designed to meet the experimental requirements imposed by the microdosimetric nature of this radiation field, clearly indicate the existence of radiation mechanisms which become effective only at higher values of LET (linear energy transfer). Accelerator irradiation studies are reviewed which conform with this conjecture. The recently discovered production of 'microlesions' in mammalian tissues by single HZE particles is possibly the most direct evidence. Open questions concerning the establishment of radiation standards for manned spaceflight, such as late effects, interaction with flight dynamic parameters, and weightlessness, are indicated. (Author)

**A82-16950** **Anesthesia, surgical aid and resuscitation in manned space missions.** L. L. Stazhadze, I. B. Goncharov, I. P. Neumyvakin, V. V. Bogomolov, and I. V. Vladimirov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1109-1113.

Medical procedures suitable for employment in space are reviewed. Reduced blood volume, the redistribution of bodily fluids, dehydration, functional hypodynamics of the myocardium, and shifts in the central or humoral parts of hemodynamic regulation have been noted in long duration space flights. The use of mutually potentiating subnarcotic anesthesia is mentioned, as well as electroanalgesia, reflexotherapy, auriculoacupuncture, and peridural anesthesia, which leaves possibilities of continued operator functioning. Conditions requiring surgery are examined, noting that decreased immunoreactivity observed among cosmonauts will necessitate gnotobiological chambers and specially designed surgeon's tools. The dangers inherent in brain edema in space during resuscitation, emergency infusion-transfusion therapy, and the existence of procedures for use in life threatening situations during extravehicular activity are indicated. M.S.K.

**A82-16951** **Biomedical aspects of artificial gravity.** A. A. Shipov, A. R. Kotovskaia, and R. R. Galle (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1117-1121. 17 refs.

Results of ground-based biomedical investigations of artificial gravity and flight experiments on the Soviet biosatellites Cosmos 782 and 936 are presented. The goal of the investigations was to determine the minimum efficient value of artificial gravity in long-term flights which may eliminate adverse effects of prolonged weightlessness. The development of methods to increase human tolerance to a rotating environment is given highest priority. The maximum angular velocity is determined to be 6 rpm, and the minimum level of the force of gravity is 0.3 g, with a radius of rotation of 10 m. D.L.G.

**A82-16953** **Trends in space life support.** A. I. Skoog (Dornier System GmbH, Friedrichshafen, West Germany) and A. O. Brouillet (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1135-1146. 5 refs.

Trends in the development of candidate physico-chemical components for use in regenerative life support systems for future extended-duration-mission spacecraft are discussed. The development of life support systems which provide air revitalization, including

CO2 reduction, water reclamation, and limited waste management will require a two-fold approach due to complexities associated with the biological support systems. For longer duration manned space flights, such as permanently inhabited space stations, it is recognized that development of biological life support systems capable of generating food and regenerating wastes will be essential to reduce logistics costs. D.L.G.

**A82-16954** **Future investigations onboard Soviet biosatellites of the Cosmos series.** E. A. Il'in (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 1149-1157. 16 refs.

Rat experiments on Cosmos biosatellites have been conducted to furnish information concerning the effects of weightlessness, artificial gravity, and ionizing radiation combined with weightlessness on structural and biochemical parameters of animal bodies. Investigations of weightlessness effects on the cardiovascular and vestibular systems, higher nervous activity, skeletal muscles, and biorhythms of two rhesus monkeys are currently being developed and tested. A study of weightlessness effects on embryogenesis of rats and bioenergetics of living systems on the Cosmos biosatellites is also planned. Physiological investigations of non-human primates will be emphasized in future Soviet flight programs, with high priority given to cardiovascular function, fluid-electrolyte metabolism, interaction of sensory systems, and the musculo-skeletal system. D.L.G.

**A82-16955** **Human roles in future space operations.** D. R. Criswell. *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 1161-1171. 45 refs. Research sponsored by the University of California.

Man's development in the biosphere from a competitor with other animals to a controller of mass flows equal to those of the biosphere is reviewed. The fundamental physical reasons for man's expansion into space are then considered: (1) more efficient equipment for conversion of solar energy into useful energy; (2) ability to handle progressively larger quantities of matter in more capital-efficient ways; (3) unlimited space within which to build new cumulated controlled connectivities (C + C + C) centers and (4) construction of environments within which decay of productive and accumulated capital can be minimized. Finally, several near-term and long-range research topics appropriate to human expansion into space are reviewed, including space stations, mixed crews, extended missions, and space colonies. J.F.

**A82-16968** † **Characteristics of loading hypoxia (Osobennosti gipoksii nagruzki).** M. M. Filippov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 753-757. 13 refs. In Russian.

The physiological changes accompanying the oxygen insufficiencies present in the body during exercise are investigated. Determinations of respiratory, hemodynamic and gas exchange indicators, measurements of blood gas composition and acid-base status, and analyses of oxygen and carbon dioxide metabolism were performed for over 300 individuals of various ages and degrees of physical training at rest and during muscular activity at sea level and in the mountains. Loading hypoxia is found to be characterized by venous hypoxemia and hypercapnia, oxygen deficiency or oxygen debt at high levels of exertion, the build-up of underoxidized metabolites, and shifts in the acid-base status of the blood and blood buffering capacity, affecting the oxygen affinity of hemoglobin. The hypoxic state is also found to be accompanied by greater respiratory and circulatory system efficiency. Four stages of loading hypoxia are distinguished according to the degree of expression and the results of compensatory mechanisms. A.L.W.

**A82-16969** † **Oxygen tension in albino rat abdominal cavity organs in normo- and hyperoxybaria (O napriazhenii kisloroda v nekotorykh organakh briushnoi polosti belykh kris pri normo- i giperoksibarii).** I. F. Sokolianskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 758-761. 16 refs. In Russian.

The relation of the partial pressure of oxygen in the external medium to that in the liver, kidney, intestinal seromuscular layers and mucosal layer in the rat is investigated. Experiments were performed on animals exposed to oxygen partial pressures from 20 to 392.2 kPa, with tissue oxygen measured polarographically in room air, normobaric hyperoxia and hyperbaric hypoxia. The increase in oxygen partial pressure is reflected to varying degrees as an increase in the oxygenation of the various organs and tissues examined. At a hyperoxybaria of 392.2 kPa, the oxygen tension in the seromuscular layer of the intestines and the liver is observed to be maintained at a high level for as long as 120 min, although the peak in tension occurs before the end of this period. A.L.W.

**A82-16970** † **The state of the air-blood barrier in hyperoxia (Sostoianie aero-gematicheskogo bar'era pri giperoksii).** T. N. Kovalenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 762-767. 15 refs. In Russian.

The effects of short-term exposure to hyperoxia on the ultrastructure and thickness of the pulmonary air-blood barrier and the surface tension of pulmonary tissue extracts are examined in adult and 2-week-old rats breathing gas mixtures of from 40 to 90% O2 for 30 min. Signs of the nonuniform deterioration of the air-blood barrier are found in rat lung following the breathing of 90% O2 in nitrogen which are more pronounced and more frequent in the young animals. These degradations are accompanied by changes in pulmonary microcirculation, a thickening of the air-blood barrier, and an increase in pulmonary surface tension in the young rats only. The breathing of 40% O2 mixtures is not found to lead to any changes in these parameters in either age group. Results thus demonstrate the potential for damage of extended exposure to 90% oxygen mixtures, and the greater sensitivity of the organism to the effects of hyperoxia at the early stages in its development. A.L.W.

**A82-16971** † **Some characteristics of thermal adaptation in small laboratory animals (O nekotorykh osobennostiakh teplovoi adaptatsii melkikh laboratornykh zhivotnykh).** V. A. Lekakh, O. N. Lagunova, and M. L. Khalin (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 819-822. 12 refs. In Russian.

The applicability of the characteristics of thermal adaptation and tolerance observed previously in the rat to other types of small laboratory animals is investigated in heat acclimatization experiments involving guinea pigs. The experiments involved twice-weekly exposures of the animals to a temperature of 42 C for a period of 1 hour, followed by the evaluation of tolerance times at the same temperature. As with rats, the guinea pigs are found to exhibit a plateau in body temperature upon exposure to heat, the duration of which may be used to evaluate heat tolerance, although that of the guinea pig may reach 42.2-42.4 C, compared to the rat's 41.6-41.8 C. Heat training is observed to extend the length of this plateau period in most animals, although it has no significant effect on the rate of body temperature change or its plateau level. Considerable individual variability in adaptive capacities is also observed, however a significant correlation is found between the rate of temperature reduction in the recovery period and the extent of thermal tolerance increase in the training period. A.L.W.

**A82-17123** **Experimental biology and medicine in space.** Iu. G. Grigor'ev (Ministry of Health of USSR, Institute of Biophysics, Moscow, USSR). *Endeavour*, vol. 5, no. 4, 1981, p. 147-151. 20 refs.

The progress of spaceborne biological studies is reviewed. Early long duration flights such as Cosmos-110 and Zond-7 returned dogs and tortoises in healthy conditions, while muscular atrophy, a decrease in muscle strength, and osteoporosis were observed on rats onboard Cosmos satellites. Cosmos-782 demonstrated the worth of centrifugal inducement of one-third g to maintain normal physiological processes. Drosophilae onboard Bios II displayed lethal mutations, cross-overs, and multiple chromosome breaks in larval reproductive cells from space gamma radiation. The deceleration of heavy nuclei is estimated to irradiate 15,000 cells with several thousand rads, a level which can significantly affect highly differentiated cells. Plants have been found to require gravity for growth, while weightlessness does not affect processes which are not dependent on gravity, such as mammalian growth. M.S.K.

**A82-17133** **Robot with sense of touch (Roboter mit Tastsinn).** G. Hirzinger (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Dynamik der Flugsysteme, Oberpfaffenhofen, West Germany). *DFVLR-Nachrichten,* Nov. 1981, p. 38-41. In German.

A description is presented of investigations related to the development of computer-controlled manipulators (robots) with touch-sensor feedback systems, taking into account work conducted in West Germany. A robot is concerned with emulating the functions of the human arm. It has, therefore, a number of joints which can be individually controlled. Many of the current robots cannot yet be programmed for the Cartesian space to which man has become accustomed. A system of computer programs was developed for the calculation of the data needed by the robot to execute the required motions. Attention is also given to a three-dimensional force-moment sensor, two alternate approaches for the sensor signal feedback system, and robot languages. Applications involving an employment of the touch sensor are also discussed, taking into account the trimming of cast-metal components and assembly operations. G.R.

**A82-17138** † **An investigation of memory during the process of adaptation to mountain conditions (Issledovanie pamiati v protsesse adaptatsii k usloviiam vysokogor'ia).** V. D. Bakharev (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 963-969. 8 refs. In Russian.

Changes in verbal memory arising during the period of human adaptation to mountain conditions are investigated. Residents of Central Asia and Pskov were tested for visual, short-term, long-term, operative, visual shape, associative, involuntary and auditory memory during stays on the plains and in the Pamir mountains at an altitude of 3400-3600 m. Reductions in all memory indicators of 10-20%, and in some cases 30%, are found during the initial period of altitude adaptation, with the peak in memory decline occurring at the end of the second day at altitude. By the 7-8th day of adaptation, the indicators of memory are restored to levels close to the original, however do not reach control levels even after 50 days. The worsening of memory is less pronounced in the residents of Central Asia than in residents of the central region, while heavy physical loads are observed to have a negative influence on memory and mental capacity. Finally, it is found that the neuromodulator (8-arginine)-vasopressin improves human memory, particularly under mountain conditions. A.L.W.

**A82-17139** † **The circadian organization of the circulatory and respiratory systems of Antarctic workers (Tsirkadnaia organizatsiia sistem krovoobrashcheniia i dykhaniia u poliarnikov v Antarktide).** V. A. D'iachkov (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) and M. P. Moshkin (Kuzbasskii Politekhnicheskii Institut, Kemerovo, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 970-973. 17 refs. In Russian.

**A82-17140** † **Pulmonary diffusing capacity under conditions of restricted motor activity (Diffuzionnaia sposobnost' legkikh v usloviiakh ogranichennoi dvigatel'noi aktivnosti).** N. A. Agadzhanian and A. N. Kotov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 974-980. 18 refs. In Russian.

The dynamics of pulmonary diffusing capacity and its membrane and capillary components are investigated in humans under conditions of prolonged motor activity restriction. Steady-state determinations of pulmonary diffusing capacity were made in subjects undergoing 49 days of strict antiorthostatic hypokinesia, strict antiorthostatic hypokinesia while exposed to hypoxic gas mixtures for a period of 3 hours twice daily, and antiorthostatic hypokinesia while performing physical exercises for a period of 1 hour twice daily. An initial increase, followed by a decrease to below original values then a reestablishment of the original level of pulmonary diffusion capacity is found which is indicative of blood redistribution. The breathing of hypoxic gas mixtures or the performance of exercises as prophylactic measures is observed to have no effect on the dynamics of diffusing capacity variations, however it tends to diminish the markedness of shifts and their duration. These prophylactic measures are also observed to maintain a high degree of correlation between diffusing capacity and respiratory volume. A.L.W.

**A82-17141** † **Monitoring the condition of the organism under hyperoxic conditions (Kontrol' sostoianiia organizma v usloviiakh giperoksii).** A. I. Selivra (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR), I. F. Sapozhkova (Ministerstvo Vysshego i Srednego Spetsial'nogo Obrazovaniia SSSR, Osoboe Konstruktorskoe Biuro Biologicheskoi i Meditsinskoi Kibernetiki, Moscow, USSR), and A. M. Rafikov (Nauchno-Issledovatel'skii Neirokhirurgicheskii Institut, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 981-989. 15 refs. In Russian.

A method is developed for the on-line processing of EEG data to obtain early indications of the onset of acute oxygen intoxication in patients undergoing hyperoxic treatments. The method, which provides for the spectral analysis of EEGs, is applied to data obtained in the monitoring of patients with either permanent injuries to the peripheral nervous system without brain pathology or vascular or traumatic brain injuries during hyperbaric oxygenation at oxygen partial pressures from 130 to 297 kPa. Early signs of the breakdown of the hyperoxia compensation in healthy people are found to include the appearance of slow rhythms in the EEG, the reduction in the amplitude of pneumogram respiratory waves, and the appearance or amplification of respiratory arrhythmias in the pulse. The algorithm finally adopted for the prediction of acute oxygen intoxication calculates the contracted modular shape coefficient of the EEG, and becomes most effective during a voluntary hyperventilation maneuver. In the case of patients with initially disturbed EEG patterns, it is recommended that EEG norms be obtained during the first few minutes of hyperoxic treatment to be used as standards for the remainder of the exposure. A.L.W.

**A82-17142** † **The effects of operator activity on the diurnal rhythm of physiological functions (Vliianie operatorskoi deiatel'nosti na sutochnuiu ritmiku fiziologicheskikh funktsii).** V. V. Romanov and A. N. Popov (Kalininskii Politekhnicheskii Institut, Kalinin, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 990-995. 15 refs. In Russian.

The effects of operator activity of various types on the daily rhythms of body temperature and cardiovascular indicators are investigated. Measurements of the daily variation in body temperature, pulse rate, arterial pressure at rest and after physical loading were made in 441 operators working uninterrupted for 6 or 12 hours or in an expectation regime for 24 hours. Increased operator workloads are found to lead to a significant decrease in the amplitudes of the daily oscillations of body temperature and cardiovascular indicators, while mean daily body temperature is unchanged and heart rate is somewhat decreased. Decreases in body temperature and heart rate at the end of the working shift are attributed to the limited motor activity involved in operator tasks. It is suggested that, rather than the absolute values or changes in pulse rate or arterial pressure, a circulatory effectiveness coefficient measured during a functional test be used to assess operator fatigue. A.L.W.

**A82-17143** † **Northern pulmonary arterial hypertension (Severnaia legochnaia arterial'naia gipertenziia).** A. P. Milovanov, B. V. Noreiko, and G. I. Moroshnichenko (Akademiia Meditsinskikh Nauk SSSR, Moscow; Blagoveshchenskii Meditsinskii Institut, Blagoveshchensk, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 996-1003. 9 refs. In Russian.

The development of pulmonary artery hypertension in persons exposed to conditions of the far north over extended periods of time is investigated. Zonal measurements of blood pressure in the pulmonary circulation ware made for 252 healthy male inhabitants of Pevek on the Arctic coast of the northeastern Soviet Union, Nar'ian-Mar in the polar region of the European north, and the Nenetsk autonomous okrug as a function of length of stay in their respective regions. Comparison with a control group examined at Blagoveshchensk in the winter reveals three stages of pulmonary hypertension in the northern inhabitants. The first stage, apparent after 3-12 months, is characterized by a threefold rise in pulmonary arterial pressure with an insignificant increase in systemic circulation. The second stage, lasting from the first to the tenth year of exposure, is marked by a decrease and eventual stabilization of pulmonary pressure at a level twice that of normal, which is observed in natives of the region and second and third generation colonists. After about 10 years of habitation in the north, pulmonary hypertension is again observed to increase, with a maximum in the lower lung regions, and to be accompanied by complaints of dyspnea during sudden changes in the weather, indicating partial pulmonary deadaptation. A.L.W.

**A82-17144 † Characteristics of indicators of cardiac rhythm in the norm and in mental maladjustment (Osobennosti pokazatelei serdechnogo ritma v norme i pri psikhicheskoi dezadaptatsii).** V. M. Vorob'ev and V. P. Chebakov. *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1004-1010. 11 refs. In Russian.

The interrelationships of cardiac rhythm indicators in the norm and in persons with different degrees of mental maladjustment are compared. Computerized processing of electrocardiographic data was used to determine the correlations between indicators of cardiac rate, quality and reactivity to orthostatic tests, clinostatic tests, mental workloads and rest following physical loads in military school candidates with completely normal psychological characteristics, normal psychological characteristics with personality accentuations, and pathological maladjustments. The presence of a psychic maladjustment is observed to lead to a breakdown in the correlations between the various cardiac indicators, particularly between those of reactivity and quality. In addition, new correlations are also observed occasionally in cases of pathological psychologies which are not found in normal groups. Changes in the correlation relationships of cardiac rhythm indicators with varying degrees of mental adaptation are explained by general mechanisms for the regulation of mental and vegetative functions. A.L.W.

**A82-17145 † The effects of bicycle ergometer exercise on plasma amino acid contents in athletes (Vliianie veloergometricheskoi nagruzki na soderzhanie aminokislot v plazme u sportsmenov).** V. G. Kukes, A. S. Nasonov, L. P. Belianova, E. N. Golubeva, L. A. Baratova, A. M. Alaverdian, and A. B. Burkashov (I Moskovskii Meditsinskii Institut; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1011-1015. 18 refs. In Russian.

The effects of bicycle ergometer exercise to the limit on the contents of free amino acids in the blood plasma of elite athletes are investigated in a study of the contributions of amino acids to muscular energy metabolism. Amino acid analyses were performed on the blood of six biathlon competitors and eight skaters 15 min before and 3 min after bicycle ergometer exercise with stepwise increasing loads starting at 1 W/kg body weight. In the skaters, who were found to exhibit a greater work capacity, plasma alanine contents are observed to increase by 52.6% with respect to initial levels in the post-exercise phase, while the levels of the remaining amino acids and total amino acid quantities did not change significantly. The biathlon competitors, having performed a lesser amount of work, exhibited no significant change in individual amino contents or total free amino acids following exercise. The increase in alamine contents in the better-conditioned athletes is attributed to the glucose-alanine cycle in which alanine is synthesized by the transamination of pyruvate during glycolytic glucose oxidation in muscles. A.L.W.

**A82-17146 † The dynamics of cardiac rhythm parameters during work under various loads (Dinamika parametrov serdechnogo ritma vo vremia raboty s razlichnoi nagruzkoi).** L. A. Beliakova and V. A. Poliantsev (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1016-1022. 14 refs. In Russian.

Differences in the dynamics of cardiac activity indicators appearing with different work loads are investigated in air traffic controllers with different levels of experience. Cardiac intervalograms were obtained by a telemonitoring system for 24 controllers aged between 25 and 30 years during the course of morning and evening shifts of duration 6 and 7.5 hours, respectively, and compared with simultaneous work levels. The cardiac indicators found to undergo the greatest variations in the presence of constantly varying work loads include parameters such as heart rate, mean square R-R interval deviation, P,T peak amplitude and ST interval displacement. Heart rhythm is observed to stabilize under increased loads in the more experienced controllers, corresponding to a more optimal state for task performance. A stabilization of heart rhythm is observed in all controllers toward the end of the shift, indicative of sympathoadrenal activation. The technique of cardiac monitoring throughout the working shift is recommended as a means for the detection of possible cardiac pathology in the air traffic controller. A.L.W.

**A82-17147 † Plasma erythropoietins during training for hyperoxic conditions (Eritropoetiny plazmy v protsesse trenirovki k usloviiam giperoksii).** V. I. Voitkevich, A. M. Volzhskaia, and L. A. Korchinskii (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1118-1120. 13 refs. In Russian.

**A82-17360 † 'Hot spots' in the problem of the origin of life ('Goriachie tochki' v probleme proiskhozhdeniia zhizni).** L. M. Mukhin. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 148-154. In Russian.

Areas presenting the most difficulty to the understanding of the origin of life are considered. The conditions present on the primitive earth are discussed, and probable siting of the nonequilibrium thermodynamic synthetic processes necessary for life in regions of underwater vulcanism and hydrothermal features is pointed out. The problems of the origin of protein synthesis in the absence of enzymes and the translation apparatus, and the evolution of the genetic code are then examined, and experimental evidence demonstrating the virtual identity of the mechanism of protein and nucleic acid synthesis over the course of 3.5 billion years is indicated. A possible sequence of events giving rise to the present system of template coding is then proposed which is based on protein self-assembly becoming associated with membrane-facilitated nucleic acid metabolism in protocells. A.L.W.

**A82-17361 † Prospects for the detection of interstellar biological molecules (Perspektivy obnaruzheniia mezhzvezdnykh biologicheskikh).** V. I. Slysh. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 155-160. 10 refs. In Russian.

The possibilities of the existence of complex biological molecules in interstellar space and of the detection of such molecules by astronomical methods are discussed. Molecular data from radioastronomical observations and laboratory experiments is presented which demonstrates the possibility of the existence of the physical conditions and precursor molecules necessary for the formation of complex molecules such as amino acids and nucleotides in interstellar space. Possible spectroscopic and direct means for the detection of such molecules are then examined, and it is concluded that amino acids and the components of nucleic acids may be detected by radioastronomical methods, whereas the search for protein molecules and DNA is possible through the use of X-ray astronomy and direct sampling. A.L.W.

**A82-17362 † Organic compounds in space and the problem of the origin of life (Organicheskie soedineniia v kosmose i problema proiskhozhdeniia zhizni).** V. S. Strel'nitskii. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 161-171. 20 refs. In Russian.

Results of the search for and investigations of organic compounds in astronomical objects are presented in view of the importance of such molecules for the origin of life. Studies of various types of organic compounds in meteorites and comets are reviewed, and detections of aliphatic and aromatic hydrocarbons, heterocyclic nitrogenous bases, sugars and amino acids in carbonaceous chondrites and of HCN and CH3CN in Comet Kohoutek are noted which confirm the possibility of organic synthesis in the protoplanetary nebula. The discovery and classification of interstellar molecules are then reviewed, and the types of objects in which they are found are indicated, including diffuse clouds, dark dust clouds, globules, molecular clouds and circumstellar envelopes. The possible universal character of the processes of pre-biotic chemical evolution is discussed. It is shown that the necessary build-up of substances necessary for the appearance of life in the Galaxy is occurring on a large scale, although it is emphasized that this is not necessarily evidence for the prevalence of life. A.L.W.

**A82-17426 * Vestibular and oculomotor physiology; Proceedings of the International Meeting, New York, NY, September 22-25, 1980.** Meeting sponsored by the Barany Society, New York Academy of Sciences, NASA, et al. Edited by B. Cohen (New York, City University, New York, NY). *New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981. 905 p.

Papers are presented showing recent progress in the understanding of the processing of visual and vestibular signals by the central nervous system to produce eye movements and postural responses. Specific topics include the directional sensitivity of hair cells to hair bundle deflection, the effects of gravity on rotatory nystagmus, the reticulovestibular organization associated with horizontal fast eye movement, the pathways controlling the extraocular eye muscles, the organization of visual-vestibular interaction in vestibular neurons, motion sickness due to vision reversal in stroboscopic light, and vestibular habituation during sinusoidal rotation. Attention is also given to vestibulo-ocular, vestibulocollic and cervicocollic reflexes, visual mossy fiber inputs to the flocculus, directional plasticity of the vestibulo-ocular reflex, the relation of active head rotation with eye-head coordination, instability in the optokinetic-vestibular system as an explanation for periodic alternating nystagmus, the effects of visual and nonvisual fixation on vestibular systagmus, interaction of saccades with the vestibulo-ocular reflex, and the role of the plantar mechanoreceptor in equilibrium control. A.L.W.

**A82-17427 Directional sensitivity of individual vertebrate hair cells to controlled deflection of their hair bundles.** S. L. Shotwell, R. Jacobs, and A. J. Hudspeth (California Institute of Technology, Pasadena, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 1-10. 12 refs. Research supported by the William Randolph Hearst Foundation, Ann Peppers Foundation, and Pew Foundation; Grants No. NIH-NS-13154; No. NIH-GM-00086.

Observations of the directional sensitivity of individual vertebrate sensory hair cells to displacements of their hair bundles are reported. Experiments were performed by the mechanical stimulation of the hair bundles at the apical ends of hair cells of bullfrog saccular maculi by fine glass capillaries slipped over the distal ends of the bundles, simultaneously with the recording of intracellular receptor potential. Deflection of the tip of the hair bundle within the hair cell plane of symmetry is observed to produce a graded depolarization of amplitude 4-20 mW when the motion is towards the kinocilium, and a graded hyperpolarization of about one fifth this magnitude when the motion is in the opposite direction. Stimulation in the plane perpendicular to the hair cell plane of symmetry produces little or no receptor potential, while stimulation in an intermediate direction produces a response that varies approximately as the cosine of its angle to the symmetry axis. Results suggest that the directional sensitivity of the hair bundle is conferred by the differing heights of the stereocilia along the plane of symmetry. A.L.W.

**A82-17428 The function of the endolymphatic duct - An experimental study using ionic lanthanum as a tracer: A preliminary report.** H. hask-Andersen, G. Bredberg, L. Lyttkens, and G. Loof (University Hospital, Uppsala, Sweden). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 11-19. 23 refs. Research supported by the Statens Medicinska Forskningsrad. SMF Project 3542; SMF Project 3908.

**A82-17429 Eye-muscle geometry and compensatory eye movements in lateral-eyed and frontal-eyed animals.** J. I. Simpson and W. Graf (New York University, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 20-30. 51 refs. Research supported by the Irma T. Hirsche Trust; Deutsche Forschungsgemeinschaft Contract No. Gr-688/1; Grant No. PHS-NS-13742.

The basis for the differences in the directions of compensatory eye movements in lateral-eyed and frontal-eyed animals is investigated by the determination of the orientations of the vertical semicircular canals and the insertions and lines of action of the oblique and vertical recti muscles in species with differing interocular angles. Muscle and vestibular orientations and muscle actions were measured or obtained from the literature for pigmented and albino rabbits, albino guinea pigs, and pigmented cats,, and compared with the literature data for humans. The pulling directions of the superior oblique and superior rectus muscles are found to change relative to the optic axis so that the ipsilateral vertical canal to which each muscle is most nearly parallel remains the same. Changes in the insertion points of the superior muscles on the ocular globe combine with the changes in lines of action to produce different secondary kinematic actions leading to different types of compensatory eye movements upon exposure of the semicircular canals to rotational stimuli. A.L.W.

**A82-17430 Phasic components of frog semicircular canal.** Y. Harada and K. Hirata (Hiroshima University, Hiroshima, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 31-39. 7 refs.

The sensory adaptation characteristics of the ampulla of the isolated frog semicircular canal are investigated. Vertical posterior semicircular canals isolated together with their ampullas and the distal stump of the ampullar nerve were stimulated by a mechanical device inducing ampullofugal currents, and the induced action potentials in the ampullar branch of the vestibular nerve were recorded. Observations of the time course of nerve activity indicate that the integrated nerve activity recorded reflects mainly the high-amplitude action potentials. Maximum values of the integrated nerve activity are found to be proportional to the logarithm of stimulus strength, and to the displacement velocity of the mechanical stimulation. When a fluid flow pulse of long duration is applied to the canal, integrated nerve activity is found to decrease exponentially during a single pulse, and to decrease with successive pulses less than 5.0 sec apart. Finally, experiments with superimposed sequential stimulation applied at various times indicate the presence of adapting units with different thresholds. A.L.W.

**A82-17431 * Physiological mechanisms of the nystagmus produced by rotations about an earth-horizontal axis.** J. M. Goldberg and C. Fernández (Chicago, University, Chicago, IL). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 40-43. 14 refs. Grants No. NIH-NS-01330; No. NGR-14-001-225.

The physiological basis of the nystagmus produced by rotation about an earth-horizontal axis is investigated with particular emphasis on the unidirectional nystagmus attributed to a bias component. Eye movement recordings were made with dc electro-oculography in alert squirrel monkeys and afferent responses were recorded from semicircular canals and otolith receptors of anesthetized animals upon rotations in the pitch and yaw planes. The eye-movement recordings show the rotation responses in the squirrel monkey to resemble those of other species, including persistent horizontal and vertical nystagmuses during yaw and pitch rotations, respectively, a unidirectional nystagmus at low rotation speeds, and postrotatory responses of relatively small amplitude and duration. The vestibular nerve recordings do not show a directionally specific dc response that can account for the bias component, but instead exhibit sinusoidal responses of peak amplitudes 0-15 and 25-75 spikes/sec for the canals and otolith, respectively. Results thus indicate that the dc signal to the oculomotor centers responsible for the nystagmus is of central origin, most likely based on some transformation of the otolith signals. A.L.W.

**A82-17432 Effects of gravity on rotatory nystagmus in monkeys.** T. Raphan, B. Cohen (New York, City University, New York, NY), and V. Henn (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 44-55. 28 refs. Swiss National Science Foundation Grant No. 3,343,0,78; Grant No. NIH-NS-00294.

The effects of rotation about an off-vertical axis on the dynamics of the slow-phase velocity of the induced nystagmus are investigated. Eye movements induced by optokinetic stimulation or by angular rotation about vertical or off-vertical axes were recorded by dc electro-oculography in 12 monkeys of various species seated within a closed drum and viewing a series of alternating vertical black and white stripes. Slow-phase velocity profiles induced by steps of angular velocity indicate that a tilt of the rotation axis 50 deg from the vertical does not affect the initial peak velocity or gain of the vestibulo-ocular reflex, however leads to the decay of the slow-phase velocity to zero, similar to the effects of vision. Off-vertical axis rotation is also observed to cancel the postrotatory nystagmus for velocities up to 50-60 deg/sec, and reduce it relative to that encountered in vertical rotation at higher velocities. In addition, experiments with changes in the inclination of the rotation axis during rotation suggest that the velocity storage mechanism is the same for the generation of continuous nystagmus during visual and vestibular stimulation about the vertical axis and for off-axis rotations. The results are interpreted in terms of a mechanism for nystagmus induced by off-vertical axis rotation which is based on the role of the velocity storage integrator in producing slow changes in eye velocity are a result of otolith and cupula stimulation. A.L.W.

**A82-17433** **Dynamic characteristics of the otolithic oculomotor system.** T. Tokita, H. Miyata, M. Masaki, and S. Ikeda (Gifu University, Gifu, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 56-68. 11 refs.

Transfer functions of the opto-oculomotor, otolithic oculomotor and opto-otolithic oculomotor systems in humans are investigated. Bode plots of the transfer functions were obtained in 10 healthy adults and five patients with bilateral loss of labyrinth excitability performing a vertical tracking test, an up-down passive displacement, and a running test in the light and the dark. The gain and phase of the opto-oculomotor system as indicated by the tracking test are found to be flat in the frequency range 0.3 to 1.0 Hz. In the up-down test in the dark, the gain of the otolithic oculomotor system increased linearly with an increase in frequency from 0.7 to 5 Hz, while in the light, the gain and phase were flat from 0.3 to 2.5 Hz. Transfer functions calculated from vertical head acceleration as input and vertical eye movement as output in the running test are observed to be similar in the dark and the light, with gain decreasing linearly with frequency increase from 0.3 to 3.0 Hz. The opto-oculomotor responses of the patients with bilateral labyrinth excitability losses are found to be the same as those of normal subjects, while three patients exhibited no eye movement response and two exhibited a periodic eye movement in the up-down test. Rhythmic eye movements corresponding to head movements are also observed in the patients during the running test, although the values of gain and phase are scattered. Results suggest that factors other than the otolithic oculomotor response may produce the observed eye movements. A.L.W.

**A82-17434** **Binocular counterrolling in humans with unilateral labyrinthectomy and in normal controls.** S. G. Diamond and C. H. Markham (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 69-79. 15 refs.

**A82-17435 *** **Ocular torsion on earth and in weightlessness.** L. R. Young, B. K. Lichtenberg, A. P. Arrott, T. A. Crites, C. M. Oman, and E. R. Edelman (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 80-92. 16 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Otolith function is studied by means of measurements of ocular torsion under various acceleration environments on earth and in weightlessness. Photographic measurements of ocular torsion as indicated by the rotation of landmarks on the iris with respect to head-fixed fiducial marks were obtained in subjects undergoing horizontal linear acceleration in a ground-based version of the space sled, lateral acceleration from weightlessness during pullout from the free-fall portion of parabolic flight, and optokinetic stimulation about the roll axis in the supine position in the laboratory and during weightlessness. The responses of ocular torsion to horizontal acceleration are in agreement with a simple low-order linear system with a dominant time constant of 0.33 sec, with a transfer function fit by a model with a pure delay of 0 to 400 msec and a first-order lag. In the pullout experiment, torsion was not observed in response to the onset of acceleration in the right-ear-down position, although it was present in response to the lateral stimulus. Results of the roll vection experiments indicate the independence of ocular torsion and visually induced tilt. In addition, an automatic video system using a soft contact lens target is presented which has been developed for ocular torsion measurements. A.L.W.

**A82-17436** **Neuronal interaction between ipsilateral medial and lateral vestibular nuclei.** I. Matsuoka, J. Ito, M. Sasa, S. Takaori (Kyoto University, Kyoto, Japan), and M. Morimoto (Kochi Medical School, Kochi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 93-101. 14 refs.

The existence of direct influences of neurons in the medial vestibular nucleus (MVN) on those of the lateral vestibular nucleus (LVN) that receive input from the peripheral nerve is investigated. Experiments were performed on anesthetized cats by electrophysiological techniques of single neuron activity recording and the horseradish peroxidase retrograde transport method. Stimulation of the MVN is found to lead to spike generation with short latency in LVN neurons monosynaptically activated by vestibular nerve stimulation, although these neurons could not respond to a high-frequency MVN stimulation. Other LVN neurons monosynaptically activated by vestibular nerve stimulation were inhibited by a conditioning stimulus to the MVN, although it is not certain whether the inhibition was monosynaptically produced. The results of the horseradish peroxidase study suggest the existence of direct innervation from the MVN to the LVN, as horseradish peroxidase positive neurons were found in the MVN following tracer ejection in the immediate vicinity of LVN neurons. The results suggest the existence of both excitatory and inhibitory input from the MVN to LVN neurons monosynaptically activated from the vestibular nerve. A.L.W.

**A82-17437** **The ascending tract of Deiters' and horizontal gaze.** S. M. Highstein and H. Reisine (Albert Einstein College of Medicine, Bronx, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 102-111. 29 refs.

The signals carried by the ascending tract of Deiters' (ATD), one of two pathways by which the medial rectus motoneuron pool receives direct signals from the posterior brain stem to maintain horizontal gaze during head motion, are investigated. Horseradish peroxidase studies confirm that the ventral lateral and medial vestibular nuclei contain a mixture of neurons that relay horizontal semicircular canal signals to the abducens nucleus via a direct projection and to the medial rectus subgroup via the ATD, while the results of acute lesions indicate that the ATD follows a middle course between the medial longitudinal fasciculus and the brachium conjunctivum in the pontine tegmentum. Intracellular recordings from medial rectus motoneurons indicate the comparable synaptic potency of the ATD and internuclear projections. Studies of inputs to the ATD neurons in anesthetized paralyzed cats provide evidence for chemical synaptic transmission between vestibular primary afferent and ventral lateral vestibular neurons, and reveal ATD neurons to be strongly modulated by contralateral vestibular stimulation. Finally, studies in the decerebrate and alert cat reveal the ATD neurons to exhibit eye positionbut little rapid eye movement sensitivity, while a strong modulation of activity is obtained in response to head rotation in the horizontal plane. Results suggest that ATD and abducens internuclear signals interact at the level of medial rectus cells to produce the horizontal vestibulo-ocular reflex and conjugate horizontal gaze. A.L.W.

**A82-17438** **Nonlinear characteristics of single neurons in the vestibular nuclei.** J. H. Ryu, B. F. McCabe, and R. W. Babin

(Iowa, University, Iowa City, IA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 112-129. 12 refs. Research supported by the U.S. Veterans Administration and University of Iowa.

The dynamic properties of the semicircular canal system are investigated by the measurement of the responses of single neurons in the vestibular nuclei to canal stimulation. Extracellular recordings of the activity of 99 vestibular nucleus neurons were obtained in cats undergoing impulse and step stimulation of the horizontal canals by angular acceleration on a rate table. A nonlinear response of the vestibular neurons to canal stimulation is evidenced by a nonlinear decrease in the time to reach the maximum response level with an increase in stimulus magnitude, a nonlinear increase in maximum response level with increasing stimulus magnitude, and the fact that the neural response to excitatory stimulus is not the mirror image of the response to an inhibitory stimulus. It is found that the nonlinear response cannot be accounted for by simulations based on several linear mathematical models of vestibular canal function. It is suggested that the nonlinearities observed may arise from (1) the nonlinear behavior of the end organ; (2) central nervous system influence; or (3) the inherent neural properties of the vestibular nuclei. A.L.W.

**A82-17439** **Reticulovestibular organization participating in generation of horizontal fast eye movement.** S. Sasaki and H. Shimazu (Tokyo, University, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 130-143. 26 refs.

The functional characteristics and axonal projections of the excitatory reticular burst neurons (EBNs), which have been identified as immediate premotor neurons participating in the activation or suppression of abducens motor activity during horizontal fast eye movement, are investigated. Spike recordings were obtained from 62 individual burst neurons in the dorsomedial reticular formation exhibiting activity only at the quick excitatory phase of the ipsilateral abducens nerve in cats undergoing horizontal rotation or electrical stimulation of the vestibular nerve. EBN discharge patterns indicate the presence of two classes of unidirectional burst neurons, with medium and long lead times. Most EBNs were antidromically activated by microstimulation within the ipsilateral abducens nucleus, indicating that the neuron sends its axon to or through the nucleus. Both the medium- and long-lead EBNs identified by antidromic activation are located in a region immediately rostral to the abducens nucleus. Microelectrode tracking reveals the axons of the EBNs to also project caudally, with collaterals to the inhibitory burst neurons and the medial vestibular nucleus. Microstimulation of the EBN area results in responses in the abducens motoneurons suggestive of monosynaptic connections with facilitation, and spike characteristics in the inhibitory burst nuclei and the medial vestibular nucleus indicating monosynaptic excitatory connections. A.L.W.

**A82-17440** **Horizontal eye movement signals in second-order vestibular nuclei neurons in the cat.** A. Berthoz, K. Yoshida, and P. P. Vidal (CNRS, Paris, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 144-156. 28 refs. Research supported by the Centre National de la Recherche Scientifique, Institut National de la Santé et de la Recherche Médicale, and Fondation de France.

**A82-17441** **A transsynaptic autoradiographic study of the pathways controlling the extraocular eye muscles, using /I-124/B-IIb Tetanus toxin fragment.** J. A. Büttner-Ennever, P. Grob, K. Akert (Zürich, Universität, Zurich, Switzerland), and B. Bizzini (Paris, Institut Pasteur, Marnes-la-Coquette, Hauts-de-Seine, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 157-170. 53 refs. Research supported by the Dr. Eric Slack-Gyr Foundation and EMDO-Stiftung; Swiss National Science Foundation Grants No. 3,636,75; No.3,611,75.

**A82-17442** **Some thoughts about the three neurons in the vestibular ocular reflex.** R. Baker, C. Evinger, and R. A. McCrea (New York University, Medical Center, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 171-188. 77 refs. Grants No. PHS-NS-13742; No. NIH-EY-02007.

Conceptual and experimental progress in the understanding of the organization and functioning of the three-neuron arc believed to produce compensatory eye movement following head rotation is outlined. Following a brief review of the purpose of the vestibular-ocular reflex (VOR) and the type of information encoded in the first- and second-order vestibular neurons and the motoneuron, measurements of the discharge rates of the primary afferent vestibular neurons and the secondary vestibular neurons in cats and primates are presented, and the similarity of central VOR organization and presumably neural processing in the two species is noted. It is argued that understanding of the three-neuron pathway has important implications for the central organization of other oculomotor subsystems, and for fixation. Difficulties in modeling the VOR with neurons reflecting population values are pointed out, and a possible solution based on tuned channels responding selectively throughout the oculomotor range to specific head movement frequencies is suggested. Finally, morphological evidence supporting the location of the phase integrator responsible for providing a second source of input to the extraocular motor nuclei in the prepositus nucleus is presented. A.L.W.

**A82-17443** **Cat medial pontine neurons in vestibular nystagmus.** C. H. Markham (California, University, Los Angeles, CA), S. Nakao (Tottori University, Yonago, Japan), and I. S. Curthoys (Sydney, University, Sydney, Australia). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 189-209. 35 refs.

**A82-17444** **Is transmission between the vestibular type I hair cell and its primary afferent chemical.** D. A. Schessel and S. M. Highstein (Albert Einstein College of Medicine, Bronx, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 210-214. 17 refs.

A morphophysiological study is presented of the nature of the transmission between the vestibular type I hair cell and the primary afferent almost completely surrounding it in a calyx configuration. The study was performed with intracellular electrodes loaded with horseradish peroxidase to record from irregular fibers in the vestibular primary afferents of the horizontal semicircular canal of the lizard Calotes versicolor. All the irregular fibers injected with horseradish perioxidase are observed to terminate with calyceal endings in the cristae and to be innervated by one to five type I hair cells. The frequency and pattern of subthreshold activity in the neurons are characteristic of chemical synaptic transmission rather than electronic, although the shape of the depolarizations is not typical of chemical excitatory postsynaptic potentials. A.L.W.

**A82-17445** **Organization of the avian accessory optic system.** N. C. Brecha and H. J. Karten (New York, State University, Stony Brook, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 215-229. 46 refs. Grants No. NIH-NS-12078; No. NIH-EY-02146.

The organization of the accessory optic system (AOS) and its possible role in oculomotor function in birds are discussed. Studies in pigeons demonstrating the connection of the basal optic root with displaced ganglion cells of the contralateral retina which may be involved in the detection of movements in peripheral visual fields are noted. The projections of the nucleus of the basal optic root complex found on the vestibulocerebellum, inferior olivary complex and oculomotor complex are examined which support the contention that the AOS plays a role in oculomotor function. Electrophysiological and behavioral studies also suggesting the role of the

AOS in oculomotor function, possibly in the initiation of an orienting movement of the eyes and neck and/or the stabilization of eye and neck movements, are pointed out. A.L.W.

**A82-17446 Visual-vestibular interaction in vestibular neurons - Functional pathway organization.** W. Precht (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 230-248. 35 refs. Research supported by the Dr. Eric Slack-Gys Foundation; Swiss National Science Foundation Grants No. 3,505,79; No. 3,616,80.

Experiments performed to examine the pathways mediating the optokinetic responses of vestibular nuclei (Vn) in the rat and cat are described. Single unit electrooculogram recordings were made in alert, both paralyzed and unparalyzed, rats and cats with or without brain lesions. The animals' eye movements elicited in the dark by trapezoidal or sinusoidal rotation of a Toennis turntable were tracked to identify type I or type II neurun excitement. All animals were sacrificed after the experiment and the brain lesions were identified. It was found that the pretectum is the first central relay in the horizontal optokinetic reflex path through Vn, and that the nucleus reticularis tegmenti pontis projects by way of oligosynaptic chains to Vn. Further experiments to find an intermediary neuron between the pretectum and Vn are indicated. M.S.K.

**A82-17447 Neural activity in the nucleus reticularis tegmenti pontis in the monkey related to eye movements and visual stimulation.** E. L. Keller and W. F. Crandall (Smith-Kettlewell Institute of Visual Sciences, San Francisco, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 249-261. 27 refs. Research supported by the Smith-Kettlewell Eye Research Foundation; Grants No. NIH-R01-EY-03280-01; No. NIH-5-P30-EY-01186.

**A82-17448 Visual-vestibular interactions in visual cortical cells in the cat.** R. H. Lahue, Jr., S. Reinis (Waterloo, University, Waterloo, Ontario, Canada), J. P. Landolt, and K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 262-273. 31 refs. Research supported by the Defence and Civil Institute of Environmental Medicine.

**A82-17449 Circularvection - Psychophysics and single-unit recordings in the monkey.** U. Büttner and V. Henn (University Hospital, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 274-283. 21 refs. Swiss National Science Foundation Grant No. 3,343,78.

Experiments are carried out to explore the upper frequency limit of sinusoidal rotation of the visual surround, which can lead either to circularvection (CV) in humans and to the modulation of vestibular-unit activity in monkeys. Two paradigms are used in the experiments. In the first, human subjects are exposed to sinusoidal rotation of an optokinetic cylinder totally enclosing the subject. Stimulus frequency of cylinder rotation is increased until the subjects no longer experience CV, perceiving only the motion of the surround. All subjects experience at least partial CV, even at stimulus frequencies above 1 Hz. In the second paradigm, monkeys are exposed to sinusoidal cylinder rotation of differing frequencies, and single-unit responses are measured in the vestibular cortex. Comparison of these responses with those of the vestibular nuclei shows that cortical neurons respond over a wider range of visual frequencies and therefore must receive additional visual input. C.R.

**A82-17450 Sigma-movement and Sigma-nystagmus - A new tool to investigate the gaze-pursuit system and visual-movement perception in man and monkey.** B. Adler, G. Curio, O.-J. Grüsser, M. Pause, U. Schreiter, L. Weiss (Berlin, Freie Universität, Berlin, West Germany), and H. Collewijn (Berlin, Freie Universität, Berlin, West Germany; Rotterdam, Universiteit, Rotterdam, Netherlands). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 284-302. 26 refs. Research supported by the European Science Foundation; Deutsche Forschungsgemeinschaft Contract No. Gr-161.

It is shown that Sigma-phenomena can be elicited not only by unidimensional periodic stimuli that are stabilized on the retina but also by (1) two-dimensional stimulus patterns composed of equidistant dots; (2) spatial periodic stimuli, the periodicity of which is not present on each retina but generated on the cyclopean retina; (3) three-dimensional objects of a spatially periodic structure; and (4) two-dimensional random dot patterns without any spatial periodicity. It is also demonstrated that constant flash intervals are not requisite for Sigma-movement, that a regular interaction occurs between the vestibulo-ocular reflex and the Sigma-movement, and that Sigma-phenomena can be elicited in awake monkeys. The phenomenon is thus accessible to further neurophysiological exploration. C.R.

**A82-17451 Motion sickness due to vision reversal - Its absence in stroboscopic light.** G. Melvill Jones and G. Mandl (McGill University, Montreal, Canada). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 303-311. 31 refs.

The modification of oculomotor control incurred by a period of vision reversal in stroboscopic light was examined over an extended frequency range to detect physiological correlates that may account for the absence of motion sickness under these conditions. Adaptive changes were found over a broad frequency spectrum after vision reversal in normal light, although the changes were restricted to a low frequency range in the stroboscopic illumination. The physiological drive to bring about adaptive change was considerably attenuated by the stroboscopically illuminated environment with specific elimination of the adaptive response in the range of 1.75-3.0 Hz, which implies a functional association between the incidence of motion sickness and the prevailing strength and/or frequency range of the adaptive drive. D.L.G.

**A82-17452 Natural retinal image motion - Origin and change.** H. Collewijn (Rotterdam, Universiteit, Rotterdam, Netherlands), A. J. Martins, and R. M. Steinman (Maryland, University, College Park, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 312-329. 14 refs. NSF Grants No. BNS-77-16474; No. BNS-80-25344; No. BNS-80-13508.

The true function of the vestibulo-ocular reflex (VOR) is thought to be more subtle than has been suspected. It is contended that the VOR serves not simply to stabilize the retinal image of a fixated object during movement but, rather, to produce and maintain the retinal image motion within each eye and between the eyes that is optimal for binocular vision. It is shown that compensation is rarely virtually perfect; even when virtually perfect in one eye, it is not in the other, leading to noncorrespondence of fixation positions between the eyes and high vergence velocities. It is also shown that the degree of compensation in the light is the same with active and passive rotations and that the VOR in the light adapts completely within minutes. The VOR in the dark is found to adapt within minutes to as much as 90% of the required change. C.R.

**A82-17453 Vestibular habituation in man and monkey during sinusoidal rotation.** J. Jäger and V. Henn (University Hospital, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 330-339. 15 refs. Swiss National Science Foundation Grant No. 3,343,0,78.

Vestibular habituation experiments were performed in monkeys and humans to determine what stimuli lead to habituation, how it relates to unit activity in the neurons along the vestibulo-ocular reflex, and how animal experiments can be related to human physiology and the sensation of motion. Experiments on vestibular habitation by repeated steps of angular velocity led to a shortening of nystagmus and to essentially similar results for humans and monkeys. High-frequency sinusoidal rotation above 0.1 Hz was found to be ineffective, while low-frequency stimulation from 0.0015 to 0.05 Hz led to a dramatic shortening of time constants after only a few cycles of stimulation. Habituation with sinusoidal velocity profiles were reported as a pleasant experience, which stands in contrast to the experience with the programs that are aimed at reducing motion sickness. D.L.G.

**A82-17454** **Unilateral habituation of vestibulo-ocular responses in the cat.** M. Jeannerod, G. Clement, J. H. Courjon (Institut National de la Santé et de la Recherche Médicale, Bron, Rhône, France), and R. Schmid (Pavia, Università, Pavia, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 340-351. 17 refs.

Unilateral vestibulo-ocular reflex (VOR) changes are investigated in cats exposed to vestibular and/or optokinetic training. The transfer of vestibular habituation aquired with one type of stimulation to oculomotor responses induced by another type are also examined. Results reconfirm the suggestion that habituation is due to a selective mechanism that modifies the gain and the dynamic characteristics of the VOR. Prolonged moving visual stimulation improves optokinetic responses by about 25 percent in cats, and produces static and dynamic VOR changes. The presence of a static VOR imbalance following optokinetic training as opposed to vestibular training, could account for the different degrees of retention of habituation. D.L.G.

**A82-17455 *** **Visually induced self-motion sensation adapts rapidly to left-right reversal of vision.** C. M. Oman and O. L. Bock (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 352-360. 24 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Three experiments were conducted using 15 adult volunteers with no overt oculomotor or vestibular disorders. In all experiments, left-right vision reversal was achieved using prism goggles, which permitted a binocular field of vision subtending approximately 45 deg horizontally and 28 deg vertically. In all experiments, circularvection (CV) was tested before and immediately after a period of exposure to reversed vision. After one to three hours of active movement while wearing vision-reversing goggles, 10 of 15 (stationary) human subjects viewing a moving stripe display experienced a self-rotation illusion in the same direction as seen stripe motion, rather than in the opposite (normal) direction, demonstrating that the central neural pathways that process visual self-rotation cues can undergo rapid adaptive modification. G.R.

**A82-17456** **Patterns of vestibular and neck responses and their interaction - A comparison between cat cortical neurons and human psychophysics.** T. Mergner, L. Deecke, and W. Becker (Ulm, Universität, Ulm, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 361-372. 16 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-70.

The paper reports on neuronal responses recorded from the anterior suprasylvian cortex in cats subjected to labyrinthine, neck and combined stimulation in the horizontal plane. Preliminary results from human psychophysics are also reported, with emphasis on what naive humans report when subjected to the same stimuli as the animals. Processing includes whole-body rotation, isolated trunk rotation, and isolated head rotation. Subtraction provides a basis for the discrimination between whole-body and isolated head rotation, and addition may optimize the indication of movement and position of the head in space. Evidence is found that during whole body rotation and isolated trunk or head rotation, essentially the same processing of labyrinthine and neck afferent inputs take place in neurons of the cats' anterior suprasylvian cortex and in humans who try to distinguish the stimulus. D.L.G.

**A82-17457** **Responses of vestibulospinal neurons to neck and macular vestibular inputs in the presence or absence of the paleocerebellum.** R. Boyle and O. Pompeiano (Pisa, Università, Pisa, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 373-394. 43 refs. Research supported by the Consiglio Nazionale delle Ricerche; Grant No. NIH-NS-07685-12.

**A82-17458** **Dynamics of vestibulo-ocular, vestibulocollic, and cervicocollic reflexes.** B. W. Peterson, G. Bilotto, J. Goldberg, and V. J. Wilson (Rockefeller University, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 395-402. 15 refs. Grants No. NIH-EY-02249; No. NIH-EY-00100; No. NIH-NS-02619.

The properties of the vestibulocollic reflex (VCR) were studied with natural stimulation over an extended frequency range and compared with properties of the vestibulo-ocular reflex (VOR). The effect of medial longitudinal fasciculus (MLF) transection on the behavior of the reflex evoked by sinusoidal rotation at frequencies ranging from 0.5 to 4 Hz was also explored. An investigation was conducted regarding the dynamic properties of the cervicocollic reflex (CCR). The response was found to be very similar to the VCR response. This result suggests that the CCR can also be considered to be a second-order lag-lead system. Attention is also given to the interaction of vestibulocollic reflex and cervicocollic reflex. G.R.

**A82-17459** **Early directional influence of visual motion cues on postural control in the falling monkey.** M. Lacour, C. Xerri (Aix-Marseille I, Université, Marseille, France), and P. P. Vidal (Aix-Marseille I, Université, Marseille; CNRS, Laboratoire de Physiologie du Travail, Paris, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 403-411. 20 refs. Research supported by the Institut National de la Sante et de la Recherche Médicale and Centre National de la Recherche Scientifique.

**A82-17460** **Velocity storage, nystagmus, and visual-vestibular interactions in humans.** B. Cohen, T. Raphan, D. Dennett (New York, City University, New York, NY), and V. Henn (New York, City University, New York, NY; Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 421-433. 32 refs. Grant No. NIH-NS-00294.

The purpose is to determine whether stored activity related to slow-phase eye velocity is present in humans and whether it contributes to visual-vestibular interactions. Data are presented demonstrating the following manifestations of stored activity related to slow-phase eye velocity: (1) optokinetic after-nystagmus (OKAN) is present after optokinetic stimulation; (2) postrotatory nystagmus velocity measured in darkness was reduced after rotation in light; (3) the velocity storage mechanism became partially charged by exposure to full-field motion for short periods of time; (4) it was discharged by exposure to a fixed visual field; and (5) various rates of field motion relative to the subject increased or decreased postrotatory nystagmus in a predictable fashion. C.R.

**A82-17461** **Aftereffects of vestibular and optokinetic stimulation and their interaction.** E. Koenig and J. Dichgans (Tübingen, Universität, Tübingen, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 434-445. 21 refs.

The influence of prior vestibular stimulation and subsequent whole-field optokinetic stimulation, or the presentation of a stationary pattern on after-nystagmus (AN) was studied in humans. Pure vestibular and pure optokinetic stimuli were employed for comparison. The presentation of a stationary pattern resulted in suppression of vestibular nystagmus, which recovered after the termination of fixation. During combinations of vestibular and optokinetic stimuli, when the elicited vestibular (VN) and optokinetic nystagmus (OKN) had the same direction, there was a weak AN I toward the direction of the preceding VN and OKN, and a strong AN II toward the opposite side. AN was always stronger into the direction opposite to the previously elicited VN, indicating that the vestibular afference is the predominant input to the secondary vestibular integrator. D.L.G.

**A82-17462** **The role of the dentate nucleus and y-group in the generation of vertical smooth eye movements.** M. C. Chubb and A. F. Fuchs (Washington, University, Seattle, WA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 446-454. 16 refs. Grants No. NIH-RR-00166; No. NIH-EY-00745; No. NIH-GM-00260.

The considered investigation makes use of a study of the relation of the neuronal activity to vertical eye movements and adequate vestibular stimulation. Three adolescent rhesus macaques (Macaca mulatta) were trained to track a small visual target while undergoing vertical sinusoidal angular acceleration. The tracking task made it possible to obtain various combinations of passive head rotation and eye movements. Recordings of neuron activity were made in all three monkeys, but electrical stimulation was applied to only one monkey. In the y-group and dentate nucleus region, most units exhibited increases in firing rate related to upward eye velocity during smooth pursuit and upward head velocity during suppression of the vestibulo-ocular reflex (VOR). G.R.

**A82-17463** **The brain-stem projection to the cerebellar flocculus relevant to optokinetic responses in cats.** T. Kawasaki, Y. Sato, K. Mizukoshi (Toyama Medical and Pharmaceutical University, Toyama, Japan), and I. Kato (Toyama Medical and Pharmaceutical University, Toyama; Yamagata University, Yamagata, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 455-464. 31 refs.

**A82-17464** **Visual mossy fiber inputs to the flocculus of the monkey.** H. Noda (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 465-475. 16 refs. Grant No. NIH-R01-EY-01051.

A study was conducted regarding the characteristics of visual signals which are brought to the flocculus of the monkey. The study was based on 19 visually responsive mossy fiber units, which were selected from a total of 1,858 units recorded from the flocculus of seven monkeys (Macaca nemestrina). Among the 1,858 units, 116 units were identified as mossy fibers on the basis of the criteria used in a preceding study. The results of the study demonstrated clearly that the visual system is an important source of sensory input to the flocculus in the monkey. Mossy fibers showing responses to movements of a random-dot background were encountered in the white matter of the flocculus. Out of 116 mossy fiber units, 19 responded to movements of visual patterns. A common feature of the responses of visual mossy fiber units was directional selectivity. G.R.

**A82-17465** **Mossy fiber activation of the cerebellar flocculus from the visual system.** K. Maekawa, M. Kimura, and T. Takeda (Jichi Medical School, Tochigi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 476-490. 40 refs. Ministry of Education of Japan Grants No. 311401; No. 57780; No. 377060.

A description is given of laboratory studies carried out to trace visual mossy fiber pathways in rabbits by means of electrophysiological and morphological (horseradish peroxidase) methods. It is shown that optic signals, after being transferred by neurons of the optic track nucleus, descend in the brain stem to activate the ipsi- and/or contralateral neurons of the nucleus reticularis tegmenti pointis (NRTP). The signals eventually reach the flocculus and bring about the mossy fiber activation of floccular Purkinje cells, which are known to project to the vestibular nuclei and to modify eye movements. The visual mossy fiber pathway through the NOT-NRTP to the flocculus contributes to optokinetic eye movements but not to a visually guided adaptive change of the vestibulo-ocular responses. C.R.

**A82-17466** **Input-output activity of the primate flocculus during visual-vestibular interaction.** W. Waespe, U. Büttner, and V. Henn (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 491-503. 23 refs. Swiss National Science Foundation Grant No. 3,343,2,70.

Cerebellar lesions in patients lead to deficits in pursuit eye movements, reduced optokinetic nystagmus, and the inability to suppress vestibular nystagmus by visual fixation. Lesions of the flocculus in primates lead to the same clinical syndrome. It is shown that floccular Purkinje cells modulate their activity to either enhance optokinetic nystagmus or suppress vestibular nystagmus during various paradigms of visual-vestibular interaction. The hypothesis is that the flocculus and the vestibular nuclei process visual-vestibular information in a complementary way: floccular Purkinje cells are modulated when vestibular nuclei activity is insufficient to move the eyes with adequate velocity, or when vestibular nuclei neurons still are modulated but nystagmus is suppressed. (Author)

**A82-17467** **Directional plasticity of the vestibulo-ocular reflex in the cat.** L. W. Schultheis and D. A. Robinson (Johns Hopkins University, Baltimore, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 504-512. 23 refs. Grant No. NIH-EY-00598.

Eight, healthy, female cats were used in this investigation. Cross-axis nystagmus was found in every cat. It is concluded that it is a general phenomenon normally present in all members of the species. Since the cross-axis eye movements had the same latency as the vestibulo-ocular reflex, cross-axis plasticity probably represents a modification of the normal vestibulo-ocular wiring as a consequence of the system's ability for self-repair, rather than some learned following movement that can occur in the dark. Vestibulo-ocular plasticity across axes seemed to depend on the magnitude and direction of image slip on the retina during training. It is suggested that the cerebellum is an important component of the learning machine that enables modification of the direction as well as the gain of the reflex, although its exact mode of action remains unknown. G.R.

**A82-17468** **The 'Error' signals subserving adaptive gain control in the primate vestibulo-ocular reflex.** F. A. Miles and S. G. Lisberger (National Institutes of Health, National Institute of Mental Health, Bethesda, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 513-525. 32 refs.

Substitutes for vestibular (head-velocity) signals are considered, taking into account experiments conducted on the monkey. It is concluded that, with respect to the monkey, eye movements per se are irrelevant so far as adaptive gain control of the vestibulo-ocular reflex (VOR) is concerned. The computation of VOR gain errors in the monkey appears to utilize some direct, internal measure of head velocity, with the vestibular signal itself presumably a prime candidate. In view of the obtained findings, it was expected that prolonged sinusoidal optokinetic stimulation would have no significant effect on VOR gain in the monkey, and this is borne out by experiment. Attention is given to substitutes for retinal slip signals, the primate flocculus, and VOR gain changes resulting from foveal pursuit tracking. A new hypothesis is presented regarding adaptive gain control in the primate VOR. G.R.

**A82-17469 *** **Active head rotations and eye-head coordination.** W. H. Zangemeister and L. Stark (California, University, Berkeley, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology,* *New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 540-559. 25 refs. Research supported by the Deutsche Forschungsgemeinschaft; Grant No. NCC2-86.

It is pointed out that head movements play an important role in gaze. The interaction between eye and head movements involves both their shared role in directing gaze and the compensatory vestibular ocular reflex. The dynamics of head trajectories are discussed, taking into account the use of parameterization to obtain the peak velocity, peak accelerations, the times of these extrema, and the duration of the movement. Attention is given to the main sequence, neck muscle EMG and details of the head-movement trajectory, types of head model accelerations, the latency of eye and head movement in coordinated gaze, gaze latency as a function of various factors, and coordinated gaze types. Clinical examples of gaze-plane analysis are considered along with the instantaneous change of compensatory eye movement (CEM) gain, and aspects of variability. G.R.

**A82-17470 Vestibular influence upon head-eye coordination.** G. R. Barnes and A. J. Prosser (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 560-570. 10 refs.

In the considered investigation an attempt was made to quantify the interaction of the nystagmus fast phase and the saccadic eye movement by instructing the subject to make voluntary head movements during the period of a postrotational vestibular stimulus. Eight subjects took part in the experiments. Subjects were rotated on a turntable for a period of 60 seconds. At the end of this period, rotation was stopped abruptly with the subject coming to rest facing in the direction of a center target light. During the ensuing period, in which a potent nystagmus was present, the subjects were exposed to one of two experimental conditions, including either target flash presentation or voluntary head rotation in the dark. The results of the investigation demonstrate that the presence of a concurrent stimulus to the vestibular system can significantly modify the temporal characteristics of head-eye coordination during voluntary head movements. G.R.

**A82-17471 Disturbances of eye-head coordination during lateral gaze in labyrinthine disease.** T. Uemura, Y. Arai, and C. Shimazaki (Tokyo Women's Medical College, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 571-578. 9 refs.

**A82-17472 The interaction between accuracy of gaze with and without head movements in patients with cerebellar ataxia.** M. Yoshida (Jichi Medical School, Tochigi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 579-589. 25 refs. Research supported by the Ministry of Health and Welfare of Japan.

**A82-17473 Nystagmus, gaze shift, and self-motion perception during sinusoidal head and neck rotation.** J. M. B. V. de Jong, G. Bovenkerk (Amsterdam, Universiteit, Amsterdam, Netherlands), and W. Bles (Amsterdam, Universiteit; Free University Hospital, Amsterdam, Netherlands). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 590-599. 11 refs.

**A82-17474 A hypothetical explanation for periodic alternating nystagmus - Instability in the optokinetic-vestibular system.** R. J. Leigh, D. A. Robinson, and D. S. Zee (Johns Hopkins University, Baltimore, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 619-635. 40 refs. Grants No. NIH-EY-05264; No. NIH-AG-00061; No. NIH-EY-00598; No. NIH-EY-01849; No. NIH-NS-11071; No. NIH-EY-01765.

**A82-17475 Effect of frontal-eye-field lesion on eye-head coordination in squirrel monkeys.** T. O-Uchi, M. Igarashi, and T. Kubo (Baylor University, Houston, TX). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 656-673. 51 refs. Research supported by the McFadden Charitable Trust Research Fund; Grants No. NIH-NS-10940; No. NIH-NS-07237.

A number of investigations appear to suggest the possibility that the frontal eye field (FEF) is involved in eye-head coordination. A study was conducted concerning the effect of FEF ablations on eye-head coordination during optokinetic and vestibular stimulation. Five healthy adult squirrel monkeys (Saimiri sciureus) weighing an average of 750 grams were used for this study. The obtained results suggest that the FEF was involved in spatial and/or temporal modulation of eye and head movements, but not involved in eye-head coordination under the present experimental conditions. G.R.

**A82-17476 Acoustic-induced eye movements.** K.-P. Schaefer, K.-J. Süss, and E. Fiebig (Göttingen, Universität, Göttingen, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 674-688. 43 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-33.

The influence of moving acoustic signals on oculomotor functions is investigated. Moving acoustic signals of varying frequency and form are applied, and visual-acoustic and vestibular-acoustic interactions are examined. Involuntary eye movements are observed in 20% of all test subjects, and are most pronounced in darkness when there is no fixation. Eye movements are influenced only slightly by a change in the amplitude of the sound movement from + or - 15 to 90 deg. Single burst signals at increasing repetition rates result in orienting reactions on the individual signals, while at high signal repetition rates above 0.5 Hz, continuous eye movements in the form of staircase jerks result. D.L.G.

**A82-17477 Modifications of vestibular nystagmus produced by fixation of visual and nonvisual targets.** R. Schmid, D. Zambarbieri, and G. Magenes (Pavia, Università, Pavia, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 689-705. 38 refs. Research supported by the Consiglio Nazionale delle Richerche.

The purpose is to further investigate the modifications of vestibular nystagmus produced by the presentation of nonvisual targets either stationary in space or moving with the subject. A quantitative-model interpretation of the experimental results provides useful suggestions on the respective roles of vestibulo-ocular reflex (VOR)-gain control and smooth-pursuit (SP) in adapting the vestibulo-ocular response to the actual oculomotor task. C.R.

**A82-17478 A physical model of human postural dynamics.** C. W. Stockwell, S. H. Koozekanani, and K. Barin (Ohio State University, Columbus, OH). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals*, vol. 374, Nov. 6, 1981, p. 722-730. 17 refs. Grant No. NIH-NS-13903.

A four-link model has been developed by adding a three-link model reported by Hemami and Jaswa (1978) to the triangular foot considered by Gurfinkel (1973). The model describes the human body in the sagittal plane with arms folded across the chest. It assumes that the body segments rotate about simple pin joints and that the spine is rigid. It further assumes that the left and right ankle joints rotate about the same axis and that the feet do not move. The body is modeled as a system composed of five homogeneous rigid segments. An investigation has been conducted to determine whether the model is adequate to describe human body sway or whether an even more complex model is required. The results thus far indicate that a four-degrees-of-freedom physical model of human postural sway is necessary and probably sufficient. The model is complex, but the governing equations are written in a form that makes evaluation feasible with a digital computer. G.R.

**A82-17479** **Dissociation of the eyes in saccadic movement.** T. Miyoshi, S. Hiwatashi, S. Kishimoto, and A. Tamada (Kyoto University, Kyoto, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 713-743. 13 refs.

It is found that in horizontal saccades, abduction and adduction are not conjugate. Abduction commences shortly before adduction and reaches the turning point shortly after adduction. The duration in binocular recording is significantly shorter than in monocular recordings. The abducting eye exhibits a tendency to move gradually on the new target. The adducting eye, however, has a tendency to overshoot. The characteristics of quick phases of horizontal optokinetic nystagmus, in which both eyes jump disconjugately to the new target, are found to be similar to those of horizontal saccades. The principal cause of this disparity may be a difference in neural mechanisms between abduction and adduction. It is noted that vertical saccades are not disconjugate. C.R.

**A82-17480** **Different effects involved in the interaction of saccades and the vestibulo-ocular reflex.** R. Jürgens, W. Becker, and P. Rieger (Ulm, Universität, Ulm, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 744-754. 6 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-70/U3.

It is thought that the mechanism responsible for the particular type of interaction that occurs between saccades and the vestibulo-ocular reflex (VOR) is related to the mechanism by which goal-directed saccades achieve their accuracy. To pursue this idea, the accuracy of goal-directed saccades during sinusoidal head rotation is investigated. It is demonstrated that saccades under such conditions have a better accuracy than expected on the basis of the results of Jurgens et al. (1981). The accuracy of human goal-directed saccades during passive sinusoidal whole-body rotation is found to be the same as that of normal saccades with the head still. There are two mechanisms contributing to this accuracy: (1) the incomplete summation (on the average, 70%) of saccade and VOR velocities; and (2) the lengthening of the duration of saccades during head rotation when VOR and saccade velocities have the same direction and the shortening of the duration when the directions are opposite. C.R.

**A82-17481** **Temporal bone characteristics in Meniere's disease.** J. Stahle, H. F. Wilbrand, and H. Rask-Andersen (University Hospital, Uppsala, Sweden). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 794-807. 27 refs. Research supported by the Statens Medicinska Forskningsrad. SMF Project 3908.

The diminished periaqueductal pneumatization of the petrous portion of the temporal bone in patients with Meniere's disease may affect the tomographic reproducibility of the aqueduct. Tomography may serve as a tool by providing a basis for the choice of surgical procedure. Histologic and Roentgenologic studies indicate that the pars rugosa of the endolymphatic sac in normals is housed inside the distal part of the vestibular aqueduct. In patients with Meniere's disease the sac might be located outside the aqueduct and therefore deprived of the functions of the loose and vascular tissue which normally surrounds it within the aqueduct, influencing the total vascular supply of the sac, and in turn interfering with its resorptive and immunodefensive functions. O.C.

**A82-17482** # **Microdisc gel electrophoresis in sodium dodecyl sulfate of organic material from rat otoconial complexes.** M. D. Ross, K. G. Pote, K. E. Rarey, and L. M. Verma (Michigan, University, Ann Arbor, MI). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 808-819. 25 refs. Grants No. NsG-9047; No. NIH-AG-00767.

The gravity receptors of all vertebrates utilize a 'test mass' consisting of a complex arrangement of mineral and organic substance that lies over the sensory receptor areas. In most vertebrates, the mineral is a polymorph of calcium carbonate in the form of minute, single crystals called otoconia. An investigation is conducted to determine the number of proteins in otoconial complexes and their molecular weights. The investigation makes use of a microdisk gel electrophoresis method reported by Gainer (1971). The most important finding of the reported research is that analysis of the proteins of the organic material of the otoconial complexes is possible when sensitive microanalytical methods are employed. Further modification of the basic technique employed and the inclusion of other sensitive staining methods should mean that, in the future, protein separation by molecular weight will be possible in sample pools containing only two otoconial masses. G.R.

**A82-17483** **The role of the plantar mechanoreceptor in equilibrium control.** I. Watanabe and J. Okubo (Tokyo Medical and Dental University, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 855-864. 19 refs.

A method for adding weight resistance to the plantar mechanoreceptors is described. The method is used in studying body-sway control mechanisms. Twenty subjects having no history of labyrinth disturbances or head injuries are used in the experiments. Of these, 16 are chosen for plantar-mechano-receptor stimulation. The order of use of the three plates is chosen at random. For purposes of comparison, 10 subjects are given a breath-holding test. It is thought that the stimulation of plantar mechanoreceptors under the experimental conditions produces its influence not only at the spinal level but is input to a higher level of the nervous system. C.R.

**A82-17484** **Ocular torsion in the cat after lesions of the interstitial nucleus of Cajal.** J. H. Anderson (Minnesota, University, Minneapolis, MN). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 865-871. 27 refs. Research supported by the University of Minnesota and NATO; Grants No. NIH-R01-NS-16567; No. NIH-P50-NS-12125.

The response to stimulation of the otolith organs during static lateral tilt is studied. In the considered case, the response is a rotation of the eyes opposite to the head tilt and is assumed not to be influenced by the semicircular canals. The objective of the study is to compare the amount of ocular counterrolling in normal cats and in cats with lesions of the interstitial nucleus of Cajal (INC). Some evidence is to be obtained that might suggest whether or not the INC plays a role in the canal-otolith interactions vis-a-vis the vertical vestibulo-ocular reflex (VOR). The results from the animals with lesions of the interstitial nucleus of Cajal suggest that the INC can influence the torsional position of the eyes. G.R.

**A82-17568** **Evaluation of the parallel conductor theory for measuring human limb blood flow by electrical admittance plethysmography.** H. Shimazu, K.-I. Yamakoshi (Hokkaido University, Hokkaido, Japan), T. Togawa (Tokyo Medical and Dental University, Tokyo, Japan), M. Fukuoka, and H. Ito (Kyorin University, Tokyo, Japan). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 1-7. 21 refs. Research supported by the Ministry of Welfare of Japan.

**A82-17569** **Magnetic measurement of cardiac volume changes.** T. Katila, T. Tuomisto, T. Varpula (Helsinki University of Technology, Esbo, Finland), R. Maniewski (Polish Academy of Sciences, Institute of Biocybernetics and Biomedical Engineering, Warsaw, Poland), and P. Siltanen (Helsinki University, Central Hospital, Helsinki, Finland). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 16-25. 19 refs. Research supported by the Academy of Finland and Emil Aaltonen Foundation.

The spatial distribution of the magnetic susceptibility plethysmography (MSPG) signal across the chest of normal subjects is presented for magnetic measurements of cardiac volume changes. Ventricular ejection of blood is exhibited in signals measured above the heart, and on the upper and lower thorax. The temporal behavior of the MSPG is compared with results obtained from existing clinical methods, including magnetic induction plethsmography, and is shown to offer some advantages. The origin of the MSPG signal is theoretically analyzed, and when a fixed cardiac magnetic dipole model is used, overall change in cardiac volume as a function of time is evaluated with reasonable accuracy when the proximity effect of the torso is taken into account. D.L.G.

**A82-17570** **Dipole localization of average and single visual evoked potentials.** R. W. Sencaj and J. I. Aunon (Purdue University, West Lafayette, IN). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Jan. 1982, p. 26-33. 30 refs. Grant No. NIH-NS-15317.

A single dipole source was chosen as a model of the neurological generator of evoked potentials elicited by illuminated checkerboard stimulation of halves and quadrants of the visual field, and a homogeneous sphere was chosen as a model for the head. Dipole locations and moments were calculated for the average evoked potentials and average dipole locations and moments were calculated for the preprocessed single evoked potentials. The average dipole locations for the single potentials appear to be more anatomically appropriate than the location due to the average evoked potentials. A relationship was demonstrated between the dipole parameters and polarity inversions in the average evoked potentials. (Author)

**A82-17571** **Human vertical fusional response under open and closed loop stimulation to predictable and unpredictable disparity presentations.** A. L. Perlmutter and A. E. Kertesz (Northwestern University, Evanston, IL). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 57-61. 10 refs. Grant No. NIH-EY-1055.

**A82-17620** **The mass extinctions of the late Mesozoic.** D. A. Russell (National Museum of Natural Sciences, Ottawa, Canada). *Scientific American,* vol. 246, Jan. 1982, p. 58-65.

Geologic evidence for a celestial body impact with earth at the end of the Mesozoic period is examined. Dinosaur fossils are noted to be present in the strata of the immediately preceding, Cretaceous, period, and absent from the later Mesozoic period. A world-wide thin layer of iridium-enriched clay has been found in the Mesozoic layer, and iridium is noted to be present in greater abundances in meteorites than in the earth's crust. Both marine cores and continental samples of the same epoch have displayed the iridium anomaly, and it is estimated that 500 billion tons of matter were deposited on the earth in one instant. Possible extra-solar system origins of the material are discussed in the light of the iridium-isotope abundance ratio of the layer being the same as that of solar system materials. The sequence of species extinction is examined from the fossil record, and it is determined that no land animal weighing more than 55 lb survived the period in question. M.S.K.

**A82-17940** # **Human orientation in space.** L. R. Young (MIT, Cambridge, MA). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 20th, Orlando, FL, Jan. 11-14, 1982, Paper 82-0422.* 10 p. 7 refs.

The usefulness of platform motion in flight simulators and the problem of space motion sickness are discussed. Human spatial orientation is defined as a perception of linear position and angular orientation, as well as their rates of change. The semicircular canals in the vestibular system provide angular acceleration information, while the otoliths are the inertial balance organs, sensing acceleration in three dimensions. Minute accelerations, such as head turning, in a weightless environment, can give rise to a false sense of a gravity field. Simulator movement is asserted to involve a compromise between visual cues and vestibular perception, the latter being a significant indicator for experienced pilots; levels of motion sufficient to excite the semicircular canals are given as 0.2 deg/sec per sec, minimum. Research to define predictors, preflight habituation training, and in-flight prevention of space motion sickness is indicated, noting that current theory holds that a sensory conflict precipitates the onset of space motion sickness. (Author)

**A82-18024** **How do we avoid confounding the direction we are looking and the direction we are moving.** D. Regan and K. I. Beverley (Dalhousie University, Halifax, Canada). *Science,* vol. 215, Jan. 8, 1982, p. 194-196. 9 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada; Grant No. AF-AFOSR-78-3711.

Contrary to a previous assumption, the center of the expanding pattern of visual flow is not generally useful as an aid in judging the direction of self motion since its direction depends on the direction of gaze. For some visual environments, however, the point of maximum rate of change of magnification in the retinal image coincides with the direction of self motion, independently of the direction of gaze. This visual indicator could be used to judge the direction of self motion. (Author)

**A82-18325** **Effects of task feedback and stringency of external pacing on mental load and work performance.** J. L. Knight and G. Salvendy (Purdue University, West Lafayette, IN). *Ergonomics,* vol. 24, Oct. 1981, p. 757-764. 5 refs. NSF Grant No. APR-77-17695.

Sixteen subjects were used to study the effects of two levels of pacing constraint and four performance feedbacks on the performance and mental load associated with a manual task. The following main conclusions emerged: (1) performance feedback reduces the mental load of the task only when the pacing constraint is low and (2) feedback improves task performance when the pacing constraint is low since operators are able to meet work requirements more closely. Feedback, however, does not improve the performance or reduce the mental load of a highly paced task. (Author)

**A82-18402** * **Fabrication and wear test of a continuous fiber/particulate composite total surface hip replacement.** J. C. Roberts, W. R. Jones, Jr. (NASA, Lewis Research Center, Cleveland, OH), and F. F. Ling (NASA, Lewis Research Center Cleveland OH; Rensselaer Polytechnic Institute, Troy, NY). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Lubrication Conference, New Orleans, LA, Oct. 5-7, 1981, ASLE Preprint 81-LC-2D-1.* 9 p. 28 refs. Grant No. DAAG29-79-C-0204.

**A82-18523** † **Study of the discrimination capacity of the auditory analyzer in flight personnel (K izucheniiu razreshaiushchei sposobnosti slukhovogo analizatora u letnogo sostava).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 44, 45. In Russian.

Thresholds for the perceptual masking of an auditory signal by noise and differential sensitivity to changes in the frequency and duration of a tonal stimulus are determined by the use of three prerecorded programs in flight personnel suffering from incipient bilateral cochlear neuritis, hypertonic neurocirculatory distonia, phase I hypertension emotional-autonomic instability, incipient bilateral cochlear neuritis in combination with emotional-autonomic instability and cerebro-vascular sclerosis. The differential frequency sensitivity threshold is found to be elevated in individuals with incipient cerebro-vascular sclerosis, hypertension and emotional-autonomic instability, while the incipient stages of cochlear neuritis do not worsen the noise stability or differential sensitivity of the auditory analyzer. The most informative indicator of the functional conditions of the auditory analyzer and central nervous system is found to be the differential sensitivity to tonal frequency changes, and it is recommended that assessment of this sensitivity by a method of constant stimulus differences be further developed for use in the clinical evaluation of air crew. A.L.W.

**A82-18524** † **The work capacity of sailors under conditions of varying work-rest cycles (Rabotosposobnost' moriakov v usloviiakh izmenennogo rezhima truda i otdykha).** V. N. Evstaf'ev, L. M. Shafran, and O. Iu. Netudykhatka. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 46, 47. 8 refs. In Russian.

**A82-18525** † **The role of physical training in the prevention of ischemic heart disease (Rol' fizicheskikh trenirovok v profilaktike ishemicheskoi bolezni serdtsa).** T. V. Khutiev. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 51-53. In Russian.

**A82-18661** † **The effects of hypokinesia on the spectral characteristics of free amino acids in the skeletal muscles and the blood (Vliianie gipokinezii na spektral'nuiu kharakteristiku svobodnykh aminokislot skeletnoi myshtsy i krovi).** B. M. Kurtser. In: Pathological physiology of certain extreme states (Patologicheskaia fiziologiia nekotorykh extremal'nykh sostoianii). Kishinev, Izdatel'stvo Shtiintsa, 1980, p. 73-78. 7 refs. In Russian.

Free amino acid compositions in the skeletal muscles and blood plasma at various stages of hypokinesia and readaptation to free motion are investigated in rats maintained in specially designed cells for periods of 10, 15 and 28 days. Analyses reveal a net decrease in total amino acid contents in the blood throughout the observational period, however an increase in skeletal muscle amino acid contents relative to initial levels by the 28th day of motion deprivation. The greatest decrease in amino acid contents in both organs is observed on the 15th day of the experiment. The results may be explained by the conversion of the plastic material represented by the free amino acids into energy substrates by the breakdown of proteins in the major organs in order to meet the increased energy requirements of the organism under stress. A.L.W.

**A82-18662 †** **Free amino acid concentrations in the livers of animals subjected to certain extremal factors (O kontsentratsii svobodnykh aminokislot v tkani pecheni zhivotnykh pri vozdeistvii na organizm nekotorykh ekstremal'nykh faktorov).** B. M. Kurtsar, M. Ia. Anestiadi, and I. A. Nastas. In: Pathological physiology of certain extreme states (Patologicheskaia fiziologiia nekotorykh extremal'nykh sostoianii). Kishinev, Izdatel'stvo Shtiintsa, 1980, p. 78-84. 9 refs. In Russian.

Measurements are presented of changes in the concentrations of free amino acids in the liver in response to visceral shock, strangulated intestinal blockage and hypokinesia. Visceral trauma induced by intestinal eventration in rats is found to lead to an elevation in liver total amino acid contents, although methionine + valine, cysteine and aspartic acid + serine levels fell. Upper strangulated intestinal blockage in dogs and hypoxia for up to 28 days in rats, on the other hand, are observed to lead to significant decreases in total free liver amino acid contents, and in individual amino acid contents with the exception of methionine + valine in both situations and phenylalanine, histidine and agrinine in hypokinesia. The elevation in total liver amino acid contents in visceral shock is attributed to a preponderance of catabolic processes over anabolic due to the greater stimulation of the sympathetic nervous system than the parasympathetic, while the decrease observed upon blockage is explained by intoxication effects and that caused by hypokinesia is related to liver atrophy and the use of amino acids as energy substrates. A.L.W.

**A82-18684 *** **Estimating cell populations.** B. S. White and K. R. Castleman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *Pattern Recognition,* vol. 13, no. 5, 1981, p. 365-370. Grant No. NIH-CB-70314; Contract No. NAS7-100.

An important step in the diagnosis of a cervical cytology specimen is estimating the proportions of the various cell types present. This is usually done with a cell classifier, the error rates of which can be expressed as a confusion matrix. We show how to use the confusion matrix to obtain an unbiased estimate of the desired proportions. We show that the mean square error of this estimate depends on a 'befuddlement matrix' derived from the confusion matrix, and how this, in turn, leads to a figure of merit for cell classifiers. Finally, we work out the two-class problem in detail and present examples to illustrate the theory. (Author)

**A82-18699 †** **Functional model of the temporal and amplitude characteristics of the cardiac electric field (Funktsional'naia model' vremennykh i amplitudnykh kharakteristik elektricheskogo polia serdtsa).** A. I. Davlet'iants, S. M. Makeev, and A. A. Popov (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kievskii Institut Inzhenerov Grazhdanskoi Aviatsii, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 52, 1981, p. 29-33. 9 refs. In Russian.

A functional model of the generation of the temporal and amplitude characteristics of the cardiac electric field is presented which may be used in the analysis of the structure of cardiac contractions during operator adaptation to various stresses. The model considers the electrical field of the contracting heart to be a superposition of the electric fields generated by the sources of the electro-cardiographic P wave, QRS complex and T wave, which are in turn stimulated by a single self-excited excitation pulse generator connected by delay lines to the respective sources. External loads are assumed to act on the temporal and amplitude characteristics of all components of the model. Possible applications of such a model include the identification of the degree of physiological stress and cardiovascular condition of aircraft system operators. A.L.W.

**A82-18700 †** **Problems of the regulation of hemodynamics during a passive orthostatic test - Study of a mathematical model (Nekotorye voprosy reguliatsii gemodinamiki vo vremia passivnoi ortostaticheskoi proby - Issledovanie na matematicheskoi modeli).** R. D. Grigorian (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 52, 1981, p. 89-93. 17 refs. In Russian.

The interactions of cardiac and vascular mechanisms and increases in skeletal muscle tonus in the hemodynamic response to passive orthostatic testing are investigated by the use of a mathematical model of the circulatory system. The response of the model, in which hemodynamic regulation occurs in response to the mismatch between a set point and the outputs of aortic and carotid baroreceptors, to the changes in heart rate, cardiac inotropic coefficient, peripheral resistance, circulatory dead volume and venous tension in the lower half of the body, was calculated in the absence of cardiovascular regulation, in the presence of normal regulation, in the presence of regulation by only the cardiac component, in the presence of regulation by the vascular component alone, and by a limited variation in vascular tonus. Time variations of aortic pressure, aortic blood flow and central venous pressure indicate that while the cardiac component is insufficient to maintain hemodynamic parameters, it acts to minimize the magnitude and duration of hemodynamic disturbances, with the vascular component responsible for the virtual constancy of aortic pressure. Results also demonstrate the necessary contributions of extramural pressure in the leg and trunk muscles to the maintenance of aortic pressure.
A.L.W.

**A82-18733** **Recent life change measurement in Canadian Forces pilots.** P. M. McCarron and N. H. Haakonson (Department of National Defence, Ottawa, Canada). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Halton, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 6-13. 27 refs.

The development of a stress measurement data base to identify accident-prone aviators is reported. One group of 158 pilots and two control groups of nonaviators totalling 173 individuals answered questionnaires which referred to recent changes in health, work, family, social, and financial personal areas. The Life Change Units obtained were compared among personnel from different Canadian air bases and between pilots and nonpilots. It was determined that less than a 0.02 probability existed that the differences between the scores of the aviators and the nonpilots were due to chance. It is concluded that although further data are needed to equate the Life Change Units with specific levels of stress, the tests did indicate that pilots are in a high risk profession, and the sources are high enough to imply that over 50% of the pilots are subject to health changes.
M.S.K.

**A82-17434** **Binocular counterrolling in humans with unilateral labyrinthectomy and in normal controls.** S. G. Diamond and C. H. Markham (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 69-79. 15 refs.

**A82-17435 *** **Ocular torsion on earth and in weightlessness.** L. R. Young, B. K. Lichtenberg, A. P. Arrott, T. A. Crites, C. M. Oman, and E. R. Edelman (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 80-92. 16 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Otolith function is studied by means of measurements of ocular torsion under various acceleration environments on earth and in weightlessness. Photographic measurements of ocular torsion as indicated by the rotation of landmarks on the iris with respect to head-fixed fiducial marks were obtained in subjects undergoing horizontal linear acceleration in a ground-based version of the space sled, lateral acceleration from weightlessness during pullout from the free-fall portion of parabolic flight, and optokinetic stimulation about the roll axis in the supine position in the laboratory and during weightlessness. The responses of ocular torsion to horizontal acceleration are in agreement with a simple low-order linear system with a dominant time constant of 0.33 sec, with a transfer function fit by a model with a pure delay of 0 to 400 msec and a first-order lag. In the pullout experiment, torsion was not observed in response to the onset of acceleration in the right-ear-down position, although it was present in response to the lateral stimulus. Results of the roll vection experiments indicate the independence of ocular torsion and visually induced tilt. In addition, an automatic video system using a soft contact lens target is presented which has been developed for ocular torsion measurements. A.L.W.

**A82-18736** **Check your oxygen.** K. E. Underwood Ground (RAF, Institute of Pathology and Tropical Medicine, Halton, Bucks., England). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Halton, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 24-26.

The history of the crash of a Beechcraft Air 200 aircraft is dissected for causes. The pilot had radioed for permission for emergency descent, was acknowledged, the plane began a circular approach, and then communications broke off. The plane circled the airport 38 times and then crashed. Subsequent autopsy of the uncremated remains revealed a reported probable cause of death of hypoxia. The cabin was noted to have a 'dump atmosphere' switch, which may have been activated at 10,000 ft, while oxygen masks were set to deploy only above 12,500 ft. It was also found that the oxygen masks delivered only 47% oxygen concentration while in use. Recommendations are given for a total oxygen system check-out before each flight, including donning the oxygen masks to ensure that they deliver oxygen. M.S.K.

**A82-18737** **Forensic dentistry.** W. M. Morlang (USAF Hospital, New York, NY). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 27-34. 20 refs.

The specialty of forensic dentistry is examined and its role in the multidisciplinary investigation of the identity of aircraft accident fatalities is addressed. State-of-the-art techniques are discussed including professional procedures and organization, radiology, documentation, and data automation. A unique procedure for courtroom presentation of identification confirmation dental radiographs is provided. The increased utilization of forensic dentistry within aviation pathology is encouraged. (Author)

**A82-18738** **Piribedil-induced anti-hypoxic protection in rats.** C. Saligaut, N. Moore, M. Daoust, P. Chretien, and F. Boismare (Rouen, Université, Saint-Etienne-du-Rouvray, Seine-Maritime, France). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 35-39. 16 refs.

The action of the dopaminergic agonist, piribedil, on a conditioned avoidance response was studied in normoxic or hypobaric hypoxic rats. This agonist has no effects in normoxia, but induces an anti-hypoxic protection (improvement of learning in hypoxia), antagonized by low doses of pimozide. The mechanism of the anti-hypoxic property seems to be mediated by the stimulation of the postsynaptic dopaminergic receptors, but does not exclude the role of noradrenergic pathways, as shown by the stabilization of norepinephrine levels during hypoxia after treatment with piribedil. (Author)

**A82-18739** **The effect of acetazolamide on the proteinuria of altitude.** A. R. Bradwell (Birmingham, University, Birmingham, England) and J. P. Delamere (Queen Elizabeth Medical Centre, Birmingham, England). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 40-43. 11 refs. Research supported by the Arthur Thomson Trust Fund, West Midlands Regional Health Authority, and Lederle Pharmaceuticals.

Albumin was measured by dipstick tests and immunologically in 24-h and early morning urine samples collected from 20 subjects during a high-altitude trek. Each was given acetazolamide (Diamox sustets) or placebo as part of a double-blind trial on the prophylactic use of acetazolamide in acute mountain sickness (AMS). At the highest altitudes, albuminuria was six times greater in those on placebo and was related to the clinical features of AMS and arterial oxygen tension. Urine dipstick tests for proteinuria were also an index of AMS, but were inaccurate. The proteinuria is probably due to renal hypoxia, which causes increased glomerular permeability, reduced tubular readsorption, or both. The reduction in the clinical features of AMS achieved with acetazolamide therapy is also associated with improved renal function. (Author)

**A82-18740** **Effect of altitude exposure on induction of Streptococcal endocarditis in young and middle-aged rats.** P. D. Altland (National Institutes of Health, Laboratory of Chemical Physics, Bethesda, MD). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 44-48. 24 refs.

**A82-18741 *** **Visual scanning behavior and mental workload in aircraft pilots.** J. R. Tole, R. L. Harris, Sr. (MIT, Cambridge, MA), A. T. Stephens (NASA, Langley Research Center, Flight Management Branch, Hampton, VA), and A. R. Ephrath (Bell Telephone Laboratories, Inc., Piscataway, NJ). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 54-61. 21 refs. Grant No. NCC1-23.

This paper describes an experimental paradigm and a set of preliminary results which demonstrate a relationship between the level of performance on a skilled man-machine control task, the skill of the operator, the level of mental difficulty induced by an additional task imposed on the basic control task, and visual scanning performance. During a constant, simulated piloting task, visual scanning of instruments was found to vary as a function of the level of difficulty of a verbal loading task. The average dwell time of each fixation on the pilot's primary instrument increased as a function of the loading. The scanning behavior was also a function of the estimated skill level of the pilots, with novices being affected by the loading task much more than experts. The results suggest that visual scanning of instruments in a controlled task may be an indicator of both workload and skill. (Author)

**A82-18742** **Measurement of systolic time intervals by electrical plethysmography - Validation with invasive and noninvasive methods.** J. Colin (Service de Santé des Armées, Centre de Recherches, Clamart, Hauts-de-Seine, France) and J. Timbal (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 62-68. 15 refs.

**A82-18743** **Surgical treatment of recurrent frontal sinus barotrauma - A case report.** D. M. Barrs and F. W. Shagets (USAF, Medical Center, Lackland AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Jan. 1982, p. 69-71. 13 refs.

It is noted that surgery is indicated in patients developing chronic documented frontal sinusitis despite medical therapy. Attention is called to the difficulty of treating flyers who do not develop chronic sinusitis but who have recurrent episodes of barotrauma-induced frontal sinusitis. It is thought that in some of these cases a ventilatory procedure is indicated. The recurrent history should first be well documented with X-rays showing the acute barosinusitis and convalescent X-rays showing interval clearing. Patients selected should not have other underlying or predisposing pathology, such as allergic or vasomotor rhinitis. The problem should be isolated to the frontal sinus and not be a component of pansinusitis. It is noted that unilateral involvement is preferable. Ventilation may then be obtained by combining naso-frontal reconstruction with intersinus septectomy. After the operation, an altitude-chamber flight is desirable before a return to flying. This could be accomplished after removing the rolled silastic sheeting. C.R.

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A83-18732 [illegible] The effect of [illegible]

[illegible] Authority, and [illegible] Pharmaceuticals.

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# STAR ENTRIES

**N82-14793** Emory Univ., Atlanta, Ga.
**STUDIES IN IN VIVO ELECTROCHEMISTRY Ph.D. Thesis**
Wayne Stuart Lindsay 1981 303 p
Avail: Univ. Microfilms Order No. 8124252

The design and construction of instrumentation for in vivo electrochemistry, solution and in vivo characterization of micro-working electrodes, the use of the multielectrode system for pharmacological and behavioral studies, statistical analysis of data, simulation studies, and the first chronoamperometric recording from a rhesus monkey are presented. In vivo data using different values for some of the experimental parameters in the simulation equation were compared to simulated data. Chronoamperometric recordings were made from the brain of an unanesthetized rhesus monkey. The electrochemical signal increased during emotional excitation and feeding. Dissert. Abstr.

**N82-14794*#** National Aeronautics and Space Administration, Washington, D. C.
**POLYPLOIDIZATION DELAY IN RAT HEPATOCYTES UNDER LIVER GROWTH INHIBITION BY HYPOKINESIA**
V. M. Faktor, V. F. Malyutin, S. Y. Li, and V. Ya. Brodskiy Jul. 1981 10 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 21, no. 4, 1979 p 397-400
(Contract NASw-3199)
(NASA-TM-76515) Avail: NTIS HC A02/MF A01 CSCL 06C

A study of young rats, weighing 55 to 59 g, after being for 10 days in conditions of limited mobility, shows a retardation of body growth as well as that of liver growth. The decrease in the rate of growth is accompanied by a reduction of cell proliferation and by delay polyploidization of hepatocytes in the liver of experimental rats. The materials, methods, and results of research are discussed. M.D.K.

**N82-14795#** Jackson Lab., Bar Harbor, Maine.
**INBORN ANEMIAS IN MICE Progress Report, 1 Aug. 1980 - 1 Jun. 1981**
Seldon E. Bernstein, Jane E. Barker, and Elizabeth S. Russell Jun. 1981 36 p
(Contract DE-AC02-76EV-03264)
(DE81-029128; DOE/EV-03264/20) Avail: NTIS HC A03/MF A01

Four macrocytic anemias, five hemolytic anemias, nonhemolytic microcytic anemia, transitory siderocytic anemia, sex-linked iron-transport anemia, an alpha-thalassemia, and a new target-cell anemia were studied. Each of these blood dyscrasias is caused by the action of a unique mutant gene, which determines the structure of different intracellular molecules, and thus controls a different metabolic process. The potential for uncovering different aspects of hemopoietic homeostatic mechanisms in the mouse is considered. Each anemia is studied through: (1) characterization of peripheral blood values, (2) determinations of radiosensitivity under a variety of conditions, (3) measurements of iron metabolism and heme synthesis, (4) histological and biochemical study of bloodforming tissue, (5) functional tests of the stem cell component, (6) examination of responses to erythroid stimuli, and (7) transplantation of tissue between individuals of differently affected genotypes. DOE

**N82-14796#** Southwest Research Inst., San Antonio, Tex.
**PLAN OF ACTION AND MILESTONES FOR NAVY COMBUSTION TOXICITY Final Report**
R. E. Adler, H. Kaplan, and M. D. Pish 1 Jan. 1981 33 p
(Contract N00173-80-C-0125)
(AD-A105623) Avail: NTIS HC A03/MF A01 CSCL 13/10

This report reviews the Workshop on Toxicology of Combustion Products held at the Naval Research Laboratory on 15-16 October 1980. Participants included U.S. Navy, other government activities, and U.S. Industry. The use of plastic materials has become more prevalent in the design of equipment and in shipboard construction. Use of these materials in quantity can create severe generation of toxic gases which can incapacitate or kill personnel in shipboard fires even if they are not in the immediate fire area. Author (GRA)

**N82-14797#** Mitre Corp., McLean, Va.
**EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT. SELECTED SHORT-TERM PULMONARY TOXICITY TESTS Final Report, Sep. 1979 - Jul. 1980**
Steve Drill and Richard Thomas Oct. 1980 131 p refs
(Contract DAMD17-78-C-8068)
(AD-A103766; MTR-80W00233) Avail: NTIS HC A07/MF A01 CSCL 06/20

Short term bioassays which demonstrate ability to assess and predict impairment of the pulmonary system resulting from exposure to chemicals were evaluated. Test procedured for determining toxic effects on the lungs and other components of the plumonary system are reviewed. The procedures are discussed in sections on morphology, respiratory mechanics, gas exchange, circulation, defense mechanisms and biochemistry. Author

**N82-14798#** Mitre Corp., McLean, Va.
**EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT. DEVELOPMENT OF PULMONARY BIOASSAYS IN SMALL ANIMALS: DIRECTORY OF INSTITUTIONS; INDIVIDUALS INVOLVED IN UTILIZATION Final Report**
Steve Drill, Richard Thomas, and Terry Zimmerman Oct. 1980 133 p
(Contract DAMD17-78-C-8068)
(AD-A103767; WP-79W00222) Avail: NTIS HC A07/MF A01 CSCL 06/20

Short term bioassays which demonstrated ability to evaluate and predict pulmonary impairment resulting from toxicant exposures were evaluated. This directory describes available pulmonary testing protocols and assesses their suitability for a screening program. Organizations currently engaged in pulmonary bioassay utilization or development are catalogued and information concerning specific measurements performed, test systems employed, compounds tested, requirements for anesthesia and terminal nature of the test are provided. Author

**N82-14799#** Oak Ridge National Lab., Tenn. Industrial Safety and Applied Health Physics Div.
**INTDOS: A COMPUTER CODE FOR ESTIMATING INTERNAL RADIATION DOSE USING RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION**
M. T. Ryan Sep. 1981 25 p refs
(Contract W-7405-eng-26)
(DE82-000507; ORNL/TM-7928) Avail: NTIS HC A02/MF A01

A user oriented computer code, INTDOS, to calculate estimates of internal radiation dose commitment resulting from the acute inhalation intake of various radionuclides was designed. The user must identify the radionuclide name, solubility class, particle size, time since exposure, and the measured lung burden. The INTDOS calculates the fraction of the lung burden remaining at time, t, postexposure considering the solubility class and particle size information. Effective committed dose equivalents to various organs and tissues of the body are calculated using inhalation committed dose factors. DOE

**N82-14800#** Brookhaven National Lab., Upton, N. Y. Biology Dept.
**REPAIR OF RADIATION DAMAGE IN MAMMALIAN CELLS**
R. B. Setlow 1981 16 p refs Presented at the NATO CNEN Conf., Rome, 24 Aug. 1981.
(Contract DE-AC02-76CH-00016)
(DE81-030824; BNL-30056; B10-3766; CONF-810873-2) Avail: NTIS HC A02/MF A01

The responses as survival, mutation, and carcinogenesis, of mammalian cells and tissues to radiation which are dependent not only on the magnitude of the damage to macromolecular structures (DNA, RNA, protein, and membranes) but on the rates of macromolecular syntheses of cells relative to the half lives of the damages are discussed. Cells possess a number of mechanisms for repairing damage to DNA. The effects of radiation and the repair of radiation damage can be explained by epidemiological data which allows the construction of dose response curves for humans. The shapes of such curves or the magnitude of the response depends on repair. Radiation damage is emphasized because: (1) radiation dosimetry is excellent compared to chemical dosimetry; (2) a number of cancer prone diseases show defects in DNA repair and radiation results in more chromosomal damage in cells from such individuals than in cells from normal individuals; (3) specific radiation products in DNA have been correlated with biological effects, and (4) many chemical effects seem to mimic radiation effects. It is indicated that damages to DNA can be the initiating events in carcinogenesis. DOE

**N82-14801#** Michigan Research Center, Inc., East Lansing.
**EVALUATIVE STUDIES IN NUCLEAR MEDICINE RESEARCH. EMISSION-COMPUTED TOMOGRAPHY ASSESSMENT Progress Report, 1 Jan. - 15 Aug. 1981**
E. James Potchen 15 Aug. 1981 18 p refs
(Contract DE-AS02-76EV-02777)
(DE81-030168; DOE/EV-02777/5) Avail: NTIS HC A02/MF A01

Imaging performance goals which need to be met to produce effective biomedical research using positron emission computer tomography are discussed. The realization of those performance goals by imaging systems, and the dependence of currently unachieved performance goals on design an operational factors along with refinement of economic estimates for the capital and operating costs of a research facility are addressed. DOE

**N82-14802#** Cornell Univ., Ithaca, N. Y. Materials Science Center.
**FIELD-ION-MICROSCOPE OBSERVATIONS OF RADIATION EFFECTS**
David N. Seidman Aug. 1981 8 p refs
(Contract DE-AS02-76ER-03158)
(DE81-030934; DOE/ER-03158/99; MSC-4555) Avail: NTIS HC A02/MF A01

The unique advantages and capabilities of the field ion microscope (FIM) and atom probe FIM for the study of the effects of particle radiation on metals are reviewed. Some contrast effects caused by radiation induced defects are discussed. DOE

**N82-14803#** Battelle Pacific Northwest Labs., Richland, Wash.
**CARCINOGENIC EFFECTS OF COAL-CONVERSION MATERIALS**
R. A. Renne and L. G. Smith Apr. 1981 29 p refs Presented at the Ind. Hyg. and Occupational Med. in Coal Conversion Proj. Workshop, Washington, D.C., 7 Nov. 1980 Submitted for publication
(Contract DE-AC06-76RL-01830)
(DE81-028108; PNL-SA-9516; CONF-801143-2) Avail: NTIS HC A03/MF A01

The correlation between mutagenesis and carcinogenesis data on complex mixtures (synfuel materials) was determined. The heavy distillate is highly mutagenic compared with the other materials tested and it was also highly carcinogenic in a mouse skin painting assay. The fractions, we give different results from those of the mutagenesis assays. The basic tar and the neutral tar skin carcinogenesis data correlate fairly well with the mutagenesis data. The need for caution against depending heavily on equating PNA content with carcinogenic activity is emphasized. It is recommended that primary aromatic amines are also monitored. DOE

**N82-14804*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**INFLUENCE OF DISPLAY AND CONTROL COMPATIBILITY ON PILOT-INDUCED OSCILLATIONS**
Marvin C. Waller, Randall L. Harris, Sr., and Lee H. Person, Jr. Dec. 1981 40 p refs
(NASA-TP-1936; L-14364) Avail: NTIS HC A03/MF A01 CSCL 05I

The differences in techniques used by seven pilots to acquire information from an advanced display for instrument approaches to and landings on a runway were investigated. A fixed base simulator programmed with dynamics resembling the terminal configured vehicle (TCV) was studied. It is shown that the seven pilots can be divided into two groups which used the display with distinctly different strategies for controlling the airplane. A related pattern of performance differences resulted. It is found that pilots who primarily use raw flight path information experience longitudinal oscillations while pilots using attitude information did not. E.A.K.

**N82-14805#** Fabrique Nationale d'Armes de Guerre, Herstal-les-Liege (Belgium).
**INITIATION INTO THE UTILIZATION OF PROGRAMMABLE INDUSTRIAL ROBOTS: GRAFCET [INITIATION A L'UTILISATION DES AUTOMATES PROGRAMMABLES INDUSTRIELS]**
P. Krzesinski Mar. 1981 25 p refs In FRENCH
Avail: NTIS HC A02/MF A01

A technique for expressing automation problems, i.e., graph of command stage and transition (GraFcet), is presented. It is intended as a methodological tool which aids in the communication of automated systems specifications between client and contractor. The language GraFcet comprehends two levels of specification. The first level describes the behavior of the command part of a system in relation to the operating part (functional specifications). The second level sets technological and environmental specifications with which the command part of a system must operate (operational specifications). Fundamental notions and the practical use of GraFcet are explained. Author (ESA)

**N82-15708*#** National Aeronautics and Space Administration, Washington, D. C.
**USSR SPACE LIFE SCIENCES DIGEST Annual Summary**
Courtland S. Lewis, ed. and Kristy L. Donnelly, ed. 1980 72 p refs Prepared jointly with BioTechnology, Inc., Arlington, Va.
(Contract NASw-3469)
(NASA-TM-84080) Avail: NTIS HC A04/MF A01 CSCL 06C

Research in exobiology, life sciences technology, space biology, and space medicine and physiology, primarily using data gathered on the Salyut 6 orbital space station, is reported. Methods for predicting, diagnosing, and preventing the effects of weightlessness are discussed. Psychological factors are discussed. The effects of space flight on plants and animals are reported. Bioinstrumentation advances are noted. R.J.F.

**N82-15709*#** George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.
**A COMPENDIUM OF HYPOKINETIC AND HYPODYNAMIC ANIMAL STUDIES Contractor Report, Dec. 1981**
Linda G. Pleasant and Phyllis T. Axelrod Washington NASA Dec. 1981 734 p
(Contract NASw-3165)
(NASA-CR-3485) Avail: NTIS HC A99/MF A01 CSCL 06C

This compendium organizes and summarizes the scientific literature dealing with the study of hypokinetic and hypodynamic animal studies. It includes both American and foreign research papers. Author

**N82-15710*#** Research Triangle Inst., Research Triangle Park, N. C.
**NASA BIOMEDICAL APPLICATIONS TEAM. APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Quarterly Report, Apr. - Jun. 1979**
D. J. Rouse, R. Beadles, H. C. Beall, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, M. McCartney, R. W. Scearce, and B. Wilson Jun. 1979 60 p refs
(Contract NAS1-14708)
(NASA-CR-152663; RTI/1411/00-07Q) Avail: NTIS HC A04/MF A01 CSCL 06C

The use of a bipolar donor-recipient model of medical technology transfer is presented. That methodology is designed to: (1) identify medical problems and aerospace technology that in combination constitute opportunities for successful medical products; (2) obtain the early participation of industry in the transfer process; and (3) obtain acceptance by the medical community of new medical products based on aerospace technology. Problem descriptions and activity reports and the results of a market study on the tissue freezing device are presented. E.A.K.

**N82-15711*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**STS-1 MEDICAL REPORT**
Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. Dec. 1981 114 p

(NASA-TM-58240; S-509) Avail: NTIS HC A06/MF A01 CSCL 06P

The report includes a review of the health of the crew before, during and immediately after the first Shuttle orbital flight (April 12-14, 1981). Areas reviewed include: health evaluation, medical debriefing of crewmembers, health stabilization program, medical training, medical kit carried inflight; tests and countermeasures for space motion sickness, cardiovascular profile, biochemistry and endocrinology results; hematology and immunology analyses; medical microbiology; food and nutrition; potable water; shuttle toxicology; radiological health; cabin acoustical noise. Also included is information on: environmental effects of Shuttle launch and landing, medical information management; and management, planning and implementation of the medical program.

**N82-15712*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### EVALUATION OF CREW HEALTH

Craig L. Fischer and Joseph Degioanni *In its* STS-1 Med. Rept. Dec. 1981 p 5-6

Avail: NTIS HC A06/MF A01 CSCL 06P

The STS-1 pre- and postflight medical evaluations are presented. Exams included: audiometry; dental examination; laboratory microbiology; physical examination; cardiovascular stress tests, including 80% treadmill; stand test weight; tonometry; and visual examination. No significant clinical problem was identified postflight. Of interest medically was the expected hyperreflexia and dependent venous stasis exhibited by both crewmen. T.M.

**N82-15713*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### INFLIGHT OBSERVATIONS

Michael A. Berry *In its* STS-1 Med. Rept. Dec. 1981 p 7-9

Avail: NTIS HC A06/MF A01 CSCL 06P

The monitoring was carried out by recording electrocardiogram (ECG) during prelaunch, launch, early orbit time, entry, and landing; monitoring crew voice transmission throughout the mission; and conducting a daily private crew medical communication. Crew performance is outlined. No medical problems of any kind were experienced by the crew. No medical treatment inflight was required except for the prophylactic use of an antimotion sickness medication that had been planned preflight. T.M.

**N82-15714*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### CREW MEDICAL DEBRIEFING

Joseph Degioanni and Craig L. Fischer *In its* STS-1 Med. Rept. Dec. 1981 p 11-17

Avail: NTIS HC A06/MF A01 CSCL 06P

The postflight debriefings of the STS-1 astronauts are presented. The debriefings are presented as dialogues taken from the tape recording of the sessions. T.M.

**N82-15715*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### HEALTH STABILIZATION PROGRAM

James K. Ferguson *In its* STS-1 Med. Rept. Dec. 1981 p 19-21

Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the HSP is to provide an environment surrounding the prime and backup crewmen which will reduce or eliminate the exposure of the crew to infectious agents. The program limited the access of large numbers of newspersons to the crew and enabled the identification and medical examination of all VIP's who visited the crew. Although several primary contacts were observed not wearing masks at required times, the great majority of primary contacts did wear masks. The STS-1 program effectively kept 38 known ill persons out of crew work areas and thereby prevented crew exposure and possible illness. T.M.

**N82-15716*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### EMERGENCY MEDICAL SERVICES SYSTEM (EMSS)

Sam E. Pool *In its* STS-1 Med. Rept. Dec. 1981 p 23-27

Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the EMSS was to provide the ill or injured crewman with rapid access to the appropriate level of medical care. In order to meet the objective, the following factors were carefully considered in developing the EMSS for STS-1: accessibility to health care centers, personnel, training, experience, transportation, response times, communications, medical records, and special environmental hazards. The system is described along with flight surgeon staffing and deployment. T.M.

**N82-15717*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### CREW MEDICAL TRAINING

James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 29-30

Avail: NTIS HC A06/MF A01 CSCL 06E

Each astronaut's initial training in the medical disciplines occurred during the first year following selection. The medical curriculum encompassed approximately 16 hours of instruction during the year. The principal areas covered include: the central and peripheral nervous systems; the auditory and vestibular systems; the visual system; dental health; the cardiovascular system; the pulmonary system, gastrointestinal system, and genitourinary system; and the musculoskeletal system. For each of these areas the astronauts were taught the basics of anatomy and physiology. In addition, they were introduced to physical examination techniques, diagnosis, and treatment of the more common ailments of the different organ systems. T.M.

**N82-15718*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### SHUTTLE ORBITAL MEDICAL SYSTEM

James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 31-35

Avail: NTIS HC A06/MF A01 CSCL 06E

The system was designed to provide treatment for life threatening emergencies and to permit diagnosis and treatment of all less severe injuries and illnesses. It is intended to sustain the medical needs of a two man crew for up to 7 days. The system is described and a detailed list of the equipment in the emergency medical kit is presented. The prescribed medical training in the performance of emergency procedures, the use of diagnostic equipment, the performance of therapeutic modalities, and the knowledge of the medical kits contents is discussed. T.M.

**N82-15719*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### VALIDATION OF PREDICTIVE TESTS AND COUNTERMEASURES FOR SPACE MOTION SICKNESS

Jerry L. Homick *In* the STS-1 Med. Rept. Dec. 1981 p 37-38

Avail: NTIS HC A06/MF A01 CSCL 06E

Inflight observations, supported by a series of pre and postflight data collection procedures, on STS-1 crewmembers in an effort to validate ground based tests which may be predictive of susceptibility to the space motion sickness syndrome are presented. Crew procedures were implemented which enabled acquisition of data to be used in validating motion sickness countermeasures. T.M.

**N82-15720*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### CREW CARDIOVASCULAR PROFILE

Michael W. Bungo *In its* STS-1 Med. Rept. Dec. 1981 p 39-45

Avail: NTIS HC A06/MF A01 CSCL 06P

Cardiovascular data was acquired in the operational mode of the flight. Heart rate and blood pressure responses are presented for each crewman. There were definable points in the mission which produce cardiovascular stress as measured by heart rate response. The stand test in both the PLT and CDR show evidence for a relative hypovolemia and perhaps a resetting of arterial regulation. The anti-G suit and G sub z acceleration effects are discussed. The anti-G suit proved to be a rather simple yet relatively effective device for increasing tolerance to +G sub z acceleration. The STS-1 flight profile produced no operationally significant alterations in G tolerance. T.M.

**N82-15721*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### BIOCHEMISTRY AND ENDOCRINOLOGY RESULTS

Carolyn S. Leach *In its* STS-1 Med. Rept. Dec. 1981 p 47-49

Avail: NTIS HC A06/MF A01 CSCL 06P

Blood (plasma or serum) biochemistry findings show postflight decreases below preflight findings for uric acid triglycerides, and AST. Postflight increases above preflight values were observed in glucose, cholesterol, BUN, calcium phosphate, angiotensin I, aldosterone, insulin, T3, T4, HGH, ACTH and GGTP. It is suggested that special attention should be given to the fluid and electrolyte intake in the astronauts so that homeostatic perturbations are not consequential. T.M.

**N82-15722*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**HEMATOLOGICAL AND IMMUNOLOGICAL ANALYSES**

Gerald R. Taylor *In its* STS-1 Med. Rept. Dec. 1981 p 51-52 refs

Avail: NTIS HC A06/MF A01 CSCL 06P

The analyses conducted on the cellular blood components of the primary and backup crewmembers indicated that for the one month period preceding the flight, there were no unusual variations in the cellular blood components of the crewmembers. However, there were alterations in both of the primary crewmembers after the flight. The explanation is that there was a phase decrease in fluid volume. Concomitant with this fluid imbalance there is also evidence to support an absolute decrease in mean erythrocyte volume, a peripherial lymphopenia, and a marked decrease in blastogenic response of lymphocytes to in vitro mitogenic challenge. T.M.

**N82-15723*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**MEDICAL MICROBIOLOGY OF CREWMEMBERS**

Duane L. Pierson *In its* STS-1 Med. Rept. Dec. 1981 p 53-58

Avail: NTIS HC A06/MF A01 CSCL 06E

A surveillance program consisting of microbial monitoring of the flight crews (prime and backup) and the spacecraft (including surfaces, food, air and water) is described. Samples were obtained from the crews and the Orbiter at specified times and were evaluated by quantitating the number of microorganisms and identifying the pathogenic and potentially pathogenic microbes. Quantitative values for total microorganisms per sample site were relatively low both pre- and postlaunch except for three sites which exhibited some microbial buildup during the flight. The circulating air in the Orbiter displayed a sharp increase in the number of airborne bacteria and fungi immediately prior to launch. T.M.

**N82-15724*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**FOOD AND NUTRITION**

Richard L. Sauer and Rita M. Rapp *In its* STS-1 Med. Rept. Dec. 1981 p 59-62

Avail: NTIS HC A06/MF A01 CSCL 06H

The menu used during STS-1 is shown in terms of food items and food forms (irradiated, freeze-dried, or beverage). The estimated mean daily inflight nutrient consumption per crewman is presented. Recommended quantities of specific nutrients are reported. T.M.

**N82-15725*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**THE POTABLE WATER**

Richard L. Sauer *In its* STS-1 Med. Rept. Dec. 1981 p 63-66

Avail: NTIS HC A06/MF A01 CSCL 06K

Periodic samples of the potable water were obtained preflight and a series of samples were taken postflight to determine the continuing microbiological and chemical quality of the water. Those parameters of nonmedical concern which were exceeded included total organics and color. Other parameters included nickel concentration, total bacteria count, and chromium concentration levels. T.M.

**N82-15726*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**SHUTTLE TOXICOLOGY**

Wayland J. Rippstein *In its* STS-1 Med. Rept. Dec. 1981 p 67-75

Avail: NTIS HC A06/MF A01 CSCL 06T

Space flight toxicity standards and methods for control and evaluation of candidate spacecraft materials selection and/or use are described. The development of methods and hardware for removal of spacecraft contaminants is discussed. The analytical chemical data obtained from the two Orbiter vehicles (OV-101 and OV-102) were reviewed. The Enterprise (OV-101) is shown to be an extremely clean vehicle, whereas the Columbia (OV-102) outgassed a significant number and quantity of contaminant gases. T.M.

**N82-15727*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**RADIOLOGICAL HEALTH**

Charles M. Barnes *In its* STS-1 Med. Rept. Dec. 1981 p 77-78

Avail: NTIS HC A06/MF A01 CSCL 06R

Dosimeters were provided for development within the crew compartment and on the astronauts flight garments to detect radiation encountered by the space crew during the mission. The STS-1 mission encountered geomagnetically trapped electrons and protons on 13 low altitude passes through the South Atlantic anomaly. The orbital inclination was such that encounters with the outer belt horn was negligible. Radiation dose to the crew from the above events was estimated to be 5 millirad. Total PDL measured dose to the crew from all sources during the STS-1 mission was 20 millirad. T.M.

**N82-15732#** Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

**FEASIBILITY STUDY (PHASE A) FOR A LIFE SCIENCE DOUBLE RACK ENVISAGED FOR THE SPACELAB MISSION D1 Final Report, Oct. 1980**

Rolf Baur, Karl-Ludwig Bitzer, Helmut Preiss, and Peter Schiller Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 83 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-W-81-037; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17.40

The lifescience double rack which is envisaged for a flight in the Spacelab mission D1 enables the performance of biomedical and botanical experiments. Besides experiment specific boxes, the double rack contains multi-user facilities like a standard botanical equipment, an oscilloscope and two centrifuges, furthermore stowage containers for auxiliary equipment. For late access and early retrieval equipment, stowage lockers in the middeck are available and in addition middeck freezers can be used during flight. A concept for the life science double rack was worked out including the flight and ground operations and the ground support equipment. Author

**N82-15733#** Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).

**CONCEPT STUDY OF A LIFE SCIENCES PAYLOAD ELEMENT (PLE) FOR THE SL-D1 MISSION Final Report, Nov. 1980**

Peter Junk, Heinrich Stegen, Wolfgang Haebel, and Manfred Ott Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 184 p refs Partly in GERMAN and ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-W-81-038; ISSN-0170-1339) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.70

Twelve life sciences experiments were selected as candidates for the Spacelab (SL)-D1 mission. They are combined to form a payload element (PLE). Experiment requirements were analyzed and completed, and technical concepts for the PLE were proposed. Interfaces were defined and missions assurance, operational, testing, and ground support aspects were considered. Most of the experiment requirements are within the capability which is supplied by the Space Transportation System, except the total stowage volume required for sample stowage in the orbiter mid deck. Also crew time is a critical parameter. The technical design concepts of the experiments are based on first Spacelab payload hardware or on existing commercial equipment, which has to be modified for SL. For realizing the SL-PLE, 32 months were estimated, starting from a definition phase. M.G.

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**SPECTROPHOTOMETRIC STUDIES ON THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 1: FUNDAMENTALS**

**OF ULTRAVIOLET SPECTROPHOTOMETRY OF NUCLEI ACIDS**
M. Belli, F. Mazzei, and G. Onori (Perugia Univ., Italy) 20 Mar. 1980 35 p refs In ITALIAN; ENGLISH summary 2 Vol.
(ISS-R-80/2-Pt-1; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The fundamentals of UV absorption spectroscopy of nucleic acids are reviewed. The relationship between the absorption of a polymer (DNA, RNA) with the absorption properties of the bases, is described. The association between spectral changes and structural modifications in nucleic acids, is also evidentiated. M.G.

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### SPECTROPHOTOMETRIC STUDIES OF THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 2: INFLUENCE OF IONS AND PROTEINS ON THE RNA SECONDARY STRUCTURE

A. Arcco, M. Belli, F. Mazzei (Perugia Univ.), and G. Onori 27 Mar. 1980 31 p refs In ITALIAN; ENGLISH summary 2 Vol.
(ISS-R-80/3-Pt-2; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The main results obtained on E.coli ribosomes and rRNA conformation are reviewed. It is shown in particular that the rRNA structure within the ribosome subunits can be affected by the interaction with proteins and with magnesium. M.G.

**N82-15736#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### FUNDAMENTALS OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE

Cai Qiao, Feng Genquan, and Yan Yuanfu 17 Jul. 1981 956 p Transl. into ENGLISH of the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 344 p
(AD-A102298; FTD-ID(RS)T-1802-80) Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological and physiological effects of flight environments were examined along with the types of environments themselves. The environments discussed are of three major types: the external environment, the cabin environment, and the internal environment of the body. Emphasis is placed on acceleration stresses and high gravity environments, flight safety and health, and the human body's reaction to the particular stresses discussed.

**N82-15737#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### THE DEVELOPMENTAL HISTORY OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 4-8 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Early research is emphasized. Several experiments in balloon flight and pressurized cabins are discussed. Problems arising from aeronautical development in World War 1 such as frostbite, hypoxia, decompression sickness, and flight fatigue are discussed. The influences of space navigational development on aerospace medicine are also discussed. The relationship between aircraft flight environment and spacecraft environment is considered. T.M.

**N82-15738#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### ENVIRONMENTAL CONDITIONS OF AVIATION AND SPACE NAVIGATION

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 9-24 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of environments are discussed: the space environment, the inner cabin environment, and the environment in the human body. Atmospheric conditions encountered in aviation and space flight were reviewed. Medically related aircraft and spacecraft environmental conditions are summarized and include low pressure, lack of oxygen, decompression, explosive decompression, and oxygen poisoning. T.M.

**N82-15739#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### GENERAL LAWS OF AVIATION AND SPACE NAVIGATION ENVIRONMENTAL EFFECTS ON THE HUMAN BODY

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 25-34 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of environmental conditions on the human body are brought about within various complex relations. The so-called action of a single condition is only the most outstanding manifestation in a certain dynamic process. The physiological changes and pathological process of the human body in space navigation as well as their reasons and reaction mechanisms were analyzed. The following factors are discussed: the qualities and composition of the environmental factors; the functioning state of the organism at the time; and man's subjective dynamic role. T.M.

**N82-15740#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### MEDICAL PROBLEMS OF GRAVITATIONAL CHANGES AND POWERED FLIGHT

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 35-37 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of gravitational change are discussed: overweightness, angular acceleration, and noise produced by air vibration. Overweightness is considered as a large increase in the gravitational force such as impact. The vestibule-autonomic nervous system reactions and motion sickness caused by angular acceleration are covered. Aerodynamic noise tolerances are discussed. T.M.

**N82-15741#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### INJURY AND PROTECTION OF OVERWEIGHTNESS

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 38-129 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Physiological acceleration and acceleration stresses are summarized. Acceleration protection in high gravity environments is emphasized. The physics of angular acceleration and impact acceleration were reviewed. The physiological effects of high gravity are presented in detail along with pilot performance results due to such stresses. T.M.

**N82-15742#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### HARMFULNESS OF VIOLENT IMPACT AND AIRFLOW SHOCKS

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 131-162 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Various types of impact on the human body resulting from aircraft accidents or sudden deceleration are discussed. Special emphasis is given to parachuting or ejection from the aircraft and protective measures to be taken. L.F.M.

**N82-15743#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**HUMAN BODY REACTION TO VIBRATION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-08) 17 Jul. 1981 p 163 223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Low frequency whole body vibrations sustained in aircraft and spacecraft are discussed. The physiological effects of such vibrations and protective measures to be taken are presented. L.F.M.

**N82-15744#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THE EFFECTS OF ROTATION AND OSCILLATION: AERIAL SICKNESS**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 195-223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aerial sickness caused by aircraft and spacecraft motion is discussed. Various motion sickness drugs and other measures for combating this sickness are presented. L.F.M.

**N82-15745#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**FLIGHT ILLUSIONS**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 224-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Flight illusions encountered by aircraft pilots are discussed. Pilot selection and training techniques as well as other measures for preventing and overcoming these illusions are presented. L.F.M.

**N82-15746#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**MAN'S ADAPTATION TO WEIGHTLESSNESS AND LOW WEIGHT**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ED(RS)T-1802-80) 17 Jul. 1981 p 244-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Weightlessness and its effect on astronauts after long exposure to it are discussed. Its causes and various means to combat it are presented. L.F.M.

**N82-15747#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**NOISE AND SENSE OF HEARING**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 296-335 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aircraft noise and its effect on pilots and others of the crew are discussed. Noise reduction techniques and steps to be taken to allow pilot efficiency in a noisy environment are presented. L.F.M.

**N82-15748#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THE PHYSIOLOGICAL EFFECT OF LOW-AIR-PRESSURE ANOXIA**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 337-398 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Anoxia, a problem of the atmospheric environment in aerospace medicine, is discussed extensively. Discussion is limited to the physiological effects of anoxia caused by low air pressure. More specifically, the effects on the human respiratory, circulatory, nervous, and metabolic systems are detailed. M.D.K.

**N82-15749#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**CAISSON DISEASE**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 398-426 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The causal factors of Caisson Disease, a problem of the atmospheric environment in aerospace medicine, are discussed. Physiological effects of the disease on the human respiratory, circulatory, digestive, and skeletal systems are considered. Effects on body organs and tissues and attendant shock and fainting are also discussed. The physiological effects (mechanical and biochemical) of the formation of bubbles inside body tissues, the main cause of Caisson Disease, are detailed. Pressurization treatment and suggested procedures for adaptation and training as preventative measures are also discussed. M.D.K.

**N82-15750#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**DANGERS OF EXPLOSIVE DECOMPRESSION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 427-439 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Explosive decompression, drastic decompression at an ascent rate of over 1.5 km/sec, in space ships is either caused by structural damage or collision with a large meteor. The physiological effects of explosive decompression, a problem of the atmospheric environment in aerospace medicine, are discussed. Specific effects on the physiological tolerances of the human respiratory (bubble formation), digestive, nervous, and circulatory systems and attendant effects on body organs are considered. Suggestions for developing adaptation, training, and preventative methodology to handle explosive decompression are given. M.D.K.

**N82-15751#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**OXYGEN TOXICATION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 440-456 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Oxygen poisoning, oxygen toxication, will be induced if the oxygen partial pressure is over 176 mm Hg and the duration is too long. The physiological effects of oxygen poisoning, a problem of the atmospheric environment in aerospace medicine, is discussed. Effects on the human respiratory and circulatory systems, hearing and vision, and body tissues are considered. Suggestions for fire prevention, safety measures, and protective equipment for use in pure oxygen environments are given. M.D.K.

**N82-15752#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THE RELATIONSHIP OF BODY TEMPERATURE TO ENVIRONMENTAL TEMPERATURE**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 457-476 Transl.

into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The unresolved problem of fluctuations in environmental temperature in aeronautics and space travel and the attendant physiological effects on the human body are considered. Environmental temperature requirements, namely optimal and tolerable temperatures, the damage done to the human body by cold and heat, and its prevention are discussed. The human body's inherent mechanisms and their responses in regulating normal body temperature are also reviewed. M.D.K.

**N82-15753#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**COMFORTABLE TEMPERATURE AND TOLERABLE TEMPERATURE**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 477-506 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The range of temperature during flight which makes people feel comfortable was examined. During passenger flights or space travel, the cabin temperature is kept in a range comfortable for the crew and passengers. However, this comfortable temperature range cannot always be maintained. Flighters always have to sacrifice comfort for speed, any complicated temperature regulation facilities adds extra weight and volume to the plane, and slow it down. The comfortable temperature range required to maintain flying ability and operational efficiency is the acceptable temperature. The comfortable, tolerable and acceptable temperatures are discussed. E.A.K.

**N82-15754#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THE PHYSIOLOGICAL EFFECT OF HEAT AND ITS PREVENTION**

*In its* Fundamentals of Aeron. and Aerospace Med Sci. (FTD-ID (RS)T-1802-80) 17 Jul. 1981 p 507-534 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The actual physiological effects of heat and preventive measures are discussed. The following issues are examined: (1) change of skin temperature and internal body temperature; (2) perspiration rate; (3) change of cardiovascular systems, respiration, and metabolism; (4) effects of heat; (5) sensitivity to temperature; (6) heat stroke; (7) heat adaptation; (8) heat damage prevention. E.A.K.

**N82-15755#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THE EFFECT OF COLD AND THE COLD PREVENTION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 535-554 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of cold, and cold prevention are described. Physiological responses to low temperatures are outlined: (1) physiological effects and damaged of cold; (2) local frostbites and injuries caused by cold; (3) effects of cold on flying ability; (4) factors affecting physiological responses to cold; (5) adaptation to cold; (6) clothing. E.A.K.

**N82-15756#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**IONIZING RADIATION AND ITS BIOLOGICAL EFFECTS**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 555-630 Transl. into ENGLISH from "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological effects of ionizing radiation are outlined. The following issues are discussed: (1) units of ionizing radiation; (2) radiation environments in space travel (solar cosmic radiation, terrestrial radiation zones); (3) radiation intensity during air and space travel (cosmic radiation in supersonic jets); (4) mechanism of radiation biological effects; (5) biological target theory; (6) radiation damage; (7) limitations of radiation safety. E.A.K.

**N82-15757#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**OTHER BIOLOGICAL EFFECTS OF RADIATION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 631-707 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The application of lasers in aerospace technology, its biological effects, and protective measures are discussed. The light simulated radiation has special characteristics of collimation and coherency, and its light pressure and destructive power is much greater than common light. Various types of lasers are solid gas, chemical, semiconductor and their light waves which have several thousand different wavelengths from ultraviolet to infrared. The use of laser technology in industrial health, and scientific research, and its use in military affairs and national defense is outlined. In the military, lasers have not only become effective measures in communications, aiming, reconnaissance, observations, night vision and navigation, but they can also be used directly as deadly weapons. E.A.K.

**N82-15758#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**VISUAL PROBLEMS IN AVIATION AND SPACE NAVIGATION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 708-739 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Visual problems encountered on aerospace navigation are discussed. Vision depends on the stimulation of visible light for realization and visible light is a type of electromagnetic radiation. The wavelength of visible light is 3,800-7,500 angstrom and photon energy lies in the range of 3.1-16.5 electron volts. After entering a high altitude or outer space, many differences occur between the visual environment and the Earth's surface, presenting aerospace medical science with many special problems concerning vision. E.A.K.

**N82-15759#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**SPACE NAVIGATION LIFE GUARANTEES**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 740-822 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Requirements for and the provision of a normal living environment and the necessary supplies of food, water, gases, and hygenic and medical safequards during space flight are discussed. The human metabolism is reviewed. Food supply and preparation methods, oxygen supply and methods of handling waste gases, the water supply and water regeneration, closed life support systems and subsystems and environmental sanitation are described. Space suit and helmet design are considered. Medical treatment and first aid, the medical experiences of the Apollo astronauts, and emergency requirements for forced landing on Earth in desert, ocean, and polar regions and the basic survival kit are discussed. The biological clock and diurnal rhythm are considered. J.D.H.

**N82-15760#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**CABIN POLLUTION**

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 822-873 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Possible pollutants existing in closed aircraft and spacecraft cabins and methods for the handling and disposal of these pollutants are described. Pollutants from fuel, waste gases, and rubber articles are considered. Excretions from the human body including gases, perspiration, feces, urine, and gastrointestinal tract gases are also sources of pollution. Pollutants originating from high altitudes and outer space, such as high altitude ozone and cosmic space radiation, are considered. J.D.H.

**N82-15761#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### AVIATION MEDICAL GUARANTEES

*In its* Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 874-889 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for pilots and air crew and how to guarantee their safety, work capabilities, and physical health in the air are discussed. The various characteristics of flight work are described. Psychological and physical preparation of air crews for flight stress are considered. J.D.H.

**N82-15762#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### SPACE NAVIGATION MEDICAL GUARANTEES AND MEDICAL SUPERVISION

*In its* Fundamental of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 890-919 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for astronauts and how to quarantee their safety, work capabilities, and physical health during space flight are discussed. The characteristics of flight work are described. Psychological and physical preparation of astronauts for flight stress are considered. Special consideration is given to the medical selection of astronauts and the medical guarantees and supervision required during training, and prior to, during, and after space flight. J.D.H.

**N82-15763#** Joint Publications Research Service, Arlington, Va.

### USSR REPORT: LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 13

10 Dec. 1981 89 p refs Transl. into ENGLISH from various Russian articles
(JPRS-79639) Copyright. Avail: Issuing Activity

The fouling of metals and petroleum products by anaerobes, the production of synthetic proteins from biomass, the development of virus-resistant varieties of plants, and general epidemiology and prophylaxis for infectious diseases are among the topics covered in this review of progress studied in the areas of biochemistry, medical science, radiation biology, and ecosystems.

**N82-15765#** Joint Publications Research Service, Arlington, Va.

### ALL-UNION CONFERENCE ON NEW SOURCES OF FOOD PROTEIN AND THEIR APPLICATION

L. A. Zakordonets *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 10-12 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 266-267 Conf. held in Tbilisi, USSR, Nov. 1980

Avail: Issuing Activity

Highlights are given of reports presented on general questions concerning the processing of protein, obtaining protein from animal and plant sources, using protein from new sources derived from meat products, dairy products, bread-making and the canning industry. A.R.H.

**N82-15766#** Joint Publications Research Service, Arlington, Va.

### ECOLOGICAL AND TECHNOLOGICAL PROBLEM OF BIODAMAGES

I. A. Kozlova and E. Z. Koval *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 13-15 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 267-268

Avail: Issuing Activity

The problem of biodamages is the ecological-technical problem of modern times, encompassing a wide circle of questions related to the study of organism-destruction from microorganisms, rodents and birds which cause damage to an enormous number of materials, resources, products and equipment and the need to develop means for protection from bioovergrowth, biodamage and biocorrosion. Topics discussed in 15 scientific reports on new directions in research on this global problem are summarized. A.R.H.

**N82-15767#** Joint Publications Research Service, Arlington, Va.

### CONFERENCE ON PLANT VIROLOGY

V. G. Krayev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 16-18 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 269-270

Avail: Issuing Activity

The basic diseases affecting agricultural ornamental plants in Poland and efforts to identify new viruses and produce resistant varieties of farm crops were reviewed in a conference attended by 70 scientists from 7 countries. Other topics discussed include: (1) the influence of viral diseases of plants and animals on food products and the productivity of livestock; (2) methods for diagnosing viral diseases and their comparative effectiveness; (3) characteristics of new viruses, strains, and isolates of plant viruses in various countries and their distribution in the seeding of cultured plants such as alfalfa, potatoes, peanuts, tomatoes, cucumbers, tabecco, and raspberries; (4) the epidemiology of viral diseases and practical means of combatting them; and (5) advances in photovirology. A.R.H.

**N82-15769*#** Research Triangle Inst., Research Triangle Park, N. C.

### APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE

H. C. Beall, R. L. Beadles, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, D. J. Rouse, and R. W. Scearce, Jr. Hampton, Va. NASA Jul. 1979 128 p refs
(Contract NAS1-14708)
(NASA-CR-159106; RTI/1411/00-05F) Avail: NTIS HC A07/MF A01 CSCL 06B

Medical products utilizing and incorporating aerospace technology were studied. A bipolar donor-recipient model for medical transfer is presented. The model is designed to: (1) identify medical problems and aerospace technology which constitute opportunities for successful medical products; (2) obtain early participation of industry in the transfer process; and (3) obtain acceptance by medical community of new medical products based on aerospace technology. E.A.K.

**N82-15770*#** Wisconsin Univ. - Madison.

### NASA BIOMEDICAL APPLICATIONS TEAM ADVISORY CENTER FOR MEDICAL TECHNOLOGY AND SYSTEMS

Final Report

Melvin P. Siedband 28 May 1981 29 p refs
(Contract NAS5-26454)
(NASA-CR-166755) Avail: NTIS HC A03/MF A01 CSCL 06B

Projects carried out by the UW-BATeam are reported. The following subjects were investigated: clinical opthalmic ultrasound improvements, magnetic cell sorters, hyperthermia treatment for cancer, joystick driving control for the handicapped, qualitative coronary artery imaging (MIPS), and speech autocuers. E.A.K.

**N82-15771#** Naval Ocean Systems Center, San Diego, Calif. Bioengineering Branch.

**REMOTE MEDICAL DIAGNOSIS SYSTEM (RMDS) UTILIZATION STUDY** Technical Progress Report, Dec. 1980 - May 1981

I. Stevens and C. Zekan (WESTEC Services, Inc.) 18 Aug. 1981 44 p refs
(Contract N00123-81-D-0353)
(AD-A105559; NOSC-TR-700) Avail: NTIS HC A03/MF A01 CSCL 06/5

Remote medical diagnosis systems are being successfully utilized for consultation in rural health care programs and private radiology practices. Consultation over RMDS-type systems reduces medical referrals and evaluations and assists in making triage decisions with a greater degree of confidence. RMDS-type systems can be used effectively for teleradiology consultations. The utilization of RMDS on ships and at remote shore sites has the potential for improved diagnoses. Nonphysician health care providers are more inclined to use telemedicine than physicians. GRA

**N82-15772#** Brookhaven National Lab., Upton, N. Y. Medical Research Center.

**APPLICATIONS OF NUCLEAR TECHNIQUES FOR IN VIVO BODY COMPOSITION STUDIES AT BROOKHAVEN NATIONAL LABORATORY**

S. H. Cohn, K. J. Ellis, D. Vartsky, A. N. Vaswani, and L. Wielopolski 1981 42 p refs Presented at the IAEA Conf. on Nucl. Based Tech. for In Vivo Study of Human Body Composition, Upton, N.Y., 22 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029922; BNL-29959; CONF-8106151-1) Avail: NTIS HC A03/MF A01

A series of technical developments and their clinical application in various nuclear technologies is described. These include the development of a portable neutron activation facility for measuring cadmium in vivo in kidney and liver, a technique for the measurement of body iron utilizing nuclear resonant scattering of gamma rays, a noninvasive measure of the skeletal levels of lead by an X-ray fluorescence technique, and the development of a pulsed Van de Graaff generator as a source of pulsed neutrons for the measurement of lung silicon. DOE

**N82-15773#** Massachusetts Inst. of Tech., Cambridge.

**MYOCARDIAL PERFUSION SCINTIGRAPHY USING A NEW TECHNIQUE, THE MESH CHAMBER** Progress Report, 1 Sep. 1978 - 1 May 1981

Louis S. Osborne and B. Leonard Holman Aug. 1981 16 p Prepared in cooperation with Harvard Medical School
(Contract DE-AS02-78EV-04969)
(DE81-027995; DOE/EV-04969/3) Avail: NTIS HC A02/MF A01

Myocardial perfusion scintigraphy performed after the injection of a potassium analogue during exercise to detect transiently ischemic myocardium due to coronary artery disease was examined. The limitation in the implementation of the technique for the screening of patients with coronary artery disease is the lack of a high resolution, positron detecting system. The positron multiwire proportional counter solves this problem. The dispersion of the absorbing material is achieved by stringing wires of high Z material, such as tungsten, in a cross pattern. The wire layers are at graded voltages, the ionization from the photoelectrons is drifted through the stack and picked up by sense wires operating in the proportional mode. Positron annihilation detectors are self collimating. The acquisition of events over a multiplicity of angles allows 3 dimensional reconstruction. The combination of large solid angle, high efficiency and a short source half life minimizes radiation dose to the patient. DOE

**N82-15774#** Pacific Northwest Lab., Richland, Wash.

**PROBLEMS IN EVALUATING HEALTH EFFECTS OF OCCUPATIONAL AND ENVIRONMENTAL EXPOSURES**

Ethel S. Gilbert 1981 23 p refs Presented at the Conf. on Statistical and Epidemiological Methods in Ionizing Radiation, Berkeley Springs, W. Va., 6-10 Jul. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028440; PNL-SA-9632; CONF-810755-1) Avail: NTIS HC A02/MF A01

The problems involved in analyzing and interpreting radiation exposure data are addressed. Existing standards for exposure are based primarily on estimates of health effects obtained by extrapolation from effects of high level exposures. Occupational and environmental exposures provide one source of data. Populations exposed in this manner were studied. Because of the size of most of the groups and the magnitude of the exposures received the amount that can be learned from such populations is severely limited. Many of these problems are illustrated by study of the effects on mortality of occupational exposure to radiation at the Hanford plant. DOE

**N82-15775#** Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

**AIRBORNE ULTRASOUND: MEASUREMENT AND POSSIBLE ADVERSE EFFECTS**

Bruce A. Herman and David Powell May 1981 19 p refs Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.
(PB81-240459; DHHS/PUB/FDA-81-8163) Avail: NTIS MF A01; SOD HC CSCL 06R

Ultrasound energy in the range of 16 kHz to 100 kHz which is used in a variety of consumer and industrial applications is discussed. For consumer devices the intended transmitting medium is usually air while industrial processes usually use liquid or solid materials as propagating media. In the latter situation attendant acoustic energy is radiated into the surrounding atmosphere. GRA

**N82-15776#** Colorado Univ., Denver. Health Sciences Center.

**NON-INVASIVE PULMONARY ARTERIAL PRESSURE MEASUREMENT** Final Report, 1 Jun. 1976 - 30 Nov. 1980

John T. Reeves 8 Jun. 1981 124 p
(Contract NO1-HR-6-2920)
(PB81-239410; NIH-NO1-HR-62920-1F) Avail: NTIS HC A06/MF A01 CSCL 06P

Pulmonary arterial pressure by noninvasive means based on measurement of hemodynamic variables, particularly pulse wave velocity, instantaneous blood flow and pulmonary arterial diameter was measured. An esophageal approach showed good pulmonary arterial flow patterns from the esophagus. A dual range gated Doppler from the front obtained Doppler flow pulses in the main pulmonary artery. A body plethysmographic technique recorded flow at the most distal part of the pulmonary vascular bed, the microcirculation. In humans undergoing right heart catheterization, pulse wave velocity was an excellent correlation of pressure in the low range. It is suggested that the scator at higher pressures is due to variations in artery diameter and wall stiffness. It is concluded that a hemodynamic approach is feasible using known techniques if the problem of measuring pulse wave velocity can be solved. GRA

**N82-15777#** National Bureau of Standards, Washington, D.C. National Engineering Lab.

**A HEAT TRANSFER ANALYSIS OF SCALD INJURY** Final Report

Robert L. Palla, Jr. Jul. 1981 69 p refs
(PB81-238503; NBSIR-81-2320) Avail: NTIS HC A04/MF A01 CSCL 06E

Numerical solutions for skin tissues temperature during scald injury events are obtained and utilized in conjunction with a thermal injury criterion, to predict critical exposure levels for various heated fluids. A one dimensional tissue model of the type used by Love is employed to determine the initial tissue temperature distribution. The bio-heat equation for tissue heat transfer is then solved via an implicit finite difference technique, subject to convective heating and cooling at the surface. The sensitivity of the critical exposure level to variation in tissue properties and convective heating coefficients is investigated. Thermal injury thresholds are presented for various fluids along with bounds to reflect uncertainty in assumed tissue properties. The results obtained are in good agreement with existing experimental scald injury data. GRA

**N82-15778#** National Inst. on Drug Abuse, Rockville, Md. Div. of Research.

**NEW APPROACHES TO TREATMENT OF CHRONIC PAIN: A REVIEW OF MULTIDISCIPLINARY PAIN CLINICS AND PAIN CENTERS**

Lorenz K. Y. Ng, ed. May 1981 212 p refs Presented at a Conf. held at Bethesda, Md., 20-21 Jun. 1980
(Contract NIDA-271-79-3607)
(PB81-240913; DHHS/PUB/ADM-81-1089; NIDA/DR081-03;

LC-81-600060: NIDA/RM-36) Avail: NTIS HC A10/MF A01 CSCL 06E

Chronic pain treatment is discussed including multidisciplinary pain clinics and centers and their staffing and organization, the problems for which patients are treated, drugs taken by entering patients, therapeutic approaches used, costs of treatment, and methods for long-term evaluation of treatment effectiveness. Goals for future research and professional and public education are also presented. GRA

**N82-15779#** Assessment Systems Corp., St. Paul, Minn.
**METHODS FOR LINKING ITEM PARAMETERS Final Report**
C. David Vale, Vincent A. Maurelli, Kathleen A. Gialluca, David J. Weiss, and Malcolm James Ree Brooks AFB, Tex. AFHRL Aug. 1981 190 p refs
(Contract F33615-80-C-0008)
(AD-A105509; AFHRL-TR-81-10) Avail: NTIS HC A09/MF A01 CSCL 05/9

A simulation study to determine appropriate linking methods for adaptive testing items was designed. Responses of examinees of three group sizes for four test lengths were simulated. Three basic data sets were created: (a) randomly sampled data set, (b) systematically sampled data set, and (c) selected data set. Three categories of evaluative criteria were used: fidelity of parameter estimation, asymptotic ability estimates, root-mean-square error of estimates, and the correlation between true and estimated ability. Test length appeared to be relatively more important to calibration effectiveness than was sample size, efficiency analyses suggested that increases in test length were at least three to four times as effective in improving calibration efficiency as proportionate increases in calibration sample sizes. The asymptotic ability analyses suggested that the linking procedures based on Bayesian ability estimation (an equivalent-groups procedure) were somewhat more effective than the others and that the equivalent-tests method was typically no better than not linking at all. Analyses using the relative efficiency criteria suggested that the equivalent-groups procedures were superior to the equivalent-tests procedures and that those using Bayesian scoring procedures were slightly superior to the others tested. Efficiency loss due to linking error was always less than that due to item calibration error and although test length and sample size had a definite effect on calibration efficiency, no strong effects appear with respect to linking efficiency. For the systematically sampled data set, the anchor-test and anchor-group methods were considered along with the equivalence methods. GRA

**N82-15780*#** Life Systems, Inc., Cleveland, Ohio.
**PREPROTOTYPE NITROGEN SUPPLY SUBSYSTEM DEVELOPMENT Interim Report, Jun. 1981**
D. B. Heppner, T. M. Hallick, and F. H. Schubert Jun. 1981 50 p refs
(Contract NAS2-10673)
(NASA-CR-166192; LSI-TR-410-4) Avail: NTIS HC A03/MF A01 CSCL 06K

A nitrogen supply subsystem based on the dissociation of hydrazine into a mixture of hydrogen and nitrogen is developed. The latter is separated to provide makeup nitrogen to control the composition of spacecraft atmospheres. Specific hardware developments resulted in the design and fabrication of a nominal 3.6 kg/d nitrogen generation module. The design integrates a hydrazine catalytic dissociator, three ammonia dissociation stages and four hydrogen separation stages into a 33 kg, 14 cu dm module. A technique was devised to alternate the ammonia dissociation and hydrogen separation stages to give high nitrogen purity in the end product stream. Tests show the product stream to contain less than 0.5 percent hydrogen and 10 parts per million ammonia. The design and development of a test stand for the nitrogen generation module and a series of tests which verified its operation and performance capability are described. S.L.

**N82-15781#** Luitpoldhuette A.G., Amberg (West Germany).
**HUMANIZATION OF WORKING PLACES IN THE FOUNDRY BY USE OF AN AUTOMATIC FETTLING EQUIPMENT Final Report**
Hanns Helge Bolle Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 64 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-004; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13,40

Operation of a pilot plant using an industrial robot in the fettling shop of a foundry is described. A continuous path 5 axis robot was employed to steer the pneumatic grinding equipment while the castings remained in a fixed position. Satisfactory removal of edges from the castings was achieved. Ergonomic analysis revealed a reduction of stress for human workers in the foundry. Problems encountered require an automatic change of tools and investigation of the wear of abrasives. J.D.H.

**N82-15782#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**A CRITERION FOR THE DISPOSAL OF M58 SLEEPING BAGS**
W. A. Lotens and E. J. M. Smienk 1979 23 p refs In DUTCH; ENGLISH summary
(Contract A77/KL/156)
(IZF-1979-15; TDCK-73398) Avail: NTIS HC A02/MF A01

In order to separate sufficiently insulating from non-sufficiently insulating sleeping bags, a convenient criterion was developed. Physical measurements showed that the thickness of the material under a pressure of 15 N/sq m gives a good correlation with insulating power. By means of a heat conduction model of a man in a bag (based on experiments with subjects) a relation between minimum tolerable outside temperature and thickness of the bag was established. It turns out that with optimal use of all personal equipment a new sleeping bag (26 mm thickness) will fail to keep a man warm in 3% of the man-nights and an old one (12 mm thickness) in 6%. It is recommended to dispose of bags with a thickness less than 20 mm. This result, however, is highly dependent on the insulative suit that is worn. M.G.

**N82-15783#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**HEARING PROTECTION**
G. F. Smoorenburg, A. M. Mimpen, and H. A. vanLeeuwen 1980 17 p refs In DUTCH; ENGLISH summary
(Contract A76/K/104)
(IZF-1980-2; TDCK-73415) Avail: NTIS HC A02/MF A01

The acoustic attenuation of 20 types of ear plugs and 20 types of ear muffs was surveyed. Important design aspects, the maximum attenuation possible closing the ear canal, the attenuation of plug plus muff, and measuring methods are discussed. To determine the attenuation for practical purposes, differences in hearing protector fitting, temporary removal of protectors, and the noise spectrum must be considered. The effect of wearing hearing protectors on speech intelligibility is discussed. Speech intelligibility does not decrease for people with normal hearing exposed to steady state noise but it may decrease in relatively silent periods of fluctuating or intermittent noise and for all noises if one has a perceptive hearing loss. Author

**N82-15784#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**EVALUATION OF CHEMICAL PROTECTIVE FACELETS AND COMPARISON OF FOUR PROTOTPYES**
W. A. Lotens 1980 21 p In DUTCH; ENGLISH summary
(Contract A79/KL/111)
(IZF-1980-15; TDCK-75013) Avail: NTIS HC A02/MF A01

In a controlled field experiment four prototypes of chemical protective facelets were tested to determine the effect on physical and mental performance, and the chemical protection and ergonomic properties. Wearing facelets decreases the physical performance on running 400 m resp. 3 km by 3.5 resp. 7.5 percent. When worn during 24 hr. physical performace is variable and mental performance decreases by ca. 10 percent. There is no indication for adaptation within a one-week period. Chemical protection is sufficient for all four types after a while of wearing, however, one of four is highly sensitive for rain. Ergonomic tests show only slight differences between the facelets but there is a marked difference in comfort. Because of this the subjects preferred two types above the other two. Protection during sleep is far from optimal. Author

**N82-15785#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**THE LINK-MILES DRIVER TRAINING SIMULATOR FOR**

**TRACKED VEHICLES: INFLUENCE OF CABIN MOTION ON GEAR-CHANGE LEARNING**
K. J. Foll 1980 15 p refs In DUTCH; ENGLISH summary
(Contract A76/KL/148)
(IZF-1980-24; TDCK-75017) Avail: NTIS HC A02/MF A01

The influence of the moving base from the Leopard driving simulator on gear-change learning was studied. Twelve trainees were trained with motion and twelve others without motion. All trainees were constantly accompanied by the instructor and after the training on the simulator, all trained on the tank. No differences between both groups were found in learning time on the simulator and in learning time on the tank. This means that the information, given by the motion, can be replaced by good instruction.
Author

**N82-15786#** Sandia Labs., Albuquerque, N. Mex.
**SIMULATOR DATA ON HUMAN ERROR PROBABILITIES**
E. J. Kozinsky (General Physics Corp.) and H. E. Guttmann 1981 7 p refs Presented at the ANS/ENS Topical Meeting on Probabilistic Risk Assessment, Port Chester, N.Y., 20 Sep. 1981
(Contract DE-AC04-76DP-00789)
(DE81-026094; SAND-81-1707C; CONF-810905-4) Avail: NTIS HC A02/MF A01

Analysis of operator errors on NPP simulators was used to determine human error probabilities (HEP). Simulator data tapes are analyzed for operator error rates. The tapes collected, using performance measurement system software, contain a history of all operator manipulations during simulated casualties. Analysis yields a time history or operational sequence diagram and a manipulation summary, both stored in computer data files. Data searches yield information on operator errors of omission and commission. This work experimentally determined HEP's for probabilistic risk assessment calculations.
DOE

**N82-15787#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.
**USE OF A TELEVISION MULTIPOINT x-y TRACKER FOR DETERMINING THE TRANSMISSION OF VIBRATIONS ON HUMAN BEINGS [UEBER DIE ANWENDUNG EINES 'TV-MULTIPOINT x-y TRACKERS' ZUR BESTIMMUNG DER SCHWINGUNGSUEBERTRAGUNG AUF DEN MENSCHEN]**
L. Vogt and E. Schwartz 1980 10 p In GERMAN
Avail: NTIS HC A02/MF A01

A television multipoint x-y tracker was used to study the influence of mechanical vibrations on the human body, in a project on human factors in man machine systems. A mechanical model of a human being seated on a shaker was employed on which the mechanical impedance and the vibration transmission (transmissibility) were investigated as a function of vibration frequency. The multipoint x-y tracker provides contactless registration of the motions of the head. The system is based on a television camera, and allows the simultaneous and continuous registration of the x and y coordinates of three points of a moving object.
Author (ESA)

**N82-15788#** Rexnord, Inc., Milwaukee, Wis. Environmental Research Center.
**EVALUATION OF AIR CLEANING AND MONITORING EQUIPMENT USED IN RECIRCULATION SYSTEMS**
Mark L. Holcomb and Robert C. Scholz Apr. 1981 200 p refs
(Contract PHS-NIOSH-210-78-0011)
(PB81-242695; DHHS/PUB/NIOSH-81-113) Avail: NTIS HC A01; SOD HC CSCL 06J

Several pilot scale air cleaners and monitors were evaluated to determine their performance characteristics, maintenance requirements, and reliability for use in a recirculating exhaust system. A set of evaluation criteria for recirculation system components were developed. Then, selected system components (including an electrostatically augmented fabric filter, electrostatic precipitator, aspirated cartridge filter, four different extractive type particulate air monitors, three different extractive ozone monitors and a safety monitoring filter were installed and tested on a welding process exhaust. The results indicate that many factors must be evaluated before a decision can be reached concerning the use of a particular device. Additionally, components of a complete recirculation monitoring system were identified and the need for the development of commercial devices incorporating all of these components was evidenced by the fact that each of the commercially available devices tested lacked one or more of these components.
GRA

**N82-15789#** National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Physical Sciences and Engineering.
**AN EVALUATION OF ENGINEERING CONTROL TECHNOLOGY FOR SPRAY PAINTING**
Dennis M. OBrien and Donald E. Hurley Jun. 1981 185 p refs
(PB81-243123; DHHS/PUB/NIOSH-81-121) Avail: NTIS MF A01; HC SOD CSCL 06J

Field surveys of 11 finishing operations provided information for an evaluation of control technology for spray painting and coating processes. Studies were conducted in the automobile refinishing, wood and metal furniture, transportation equipment (nonautomotive), heavy machinery, and appliance finishing industries. Processes selected provide representative coverage of spray finishing operations relative to the number of exposed workers, different control techniques, physical size of the workpiece, and the coating systems that are typically used. Control of selected health hazards is discussed; available control options evaluated. Case study summaries include analysis of: hazards, engineering controls and work practices, ventilation measurements, air sampling data and personal protective equipment. Results should be usable as a reference source.
GRA

[illegible]

N81-19971# Life Systems, Inc., Cleveland, Ohio.

PREPROTOTYPE NITROGEN SUPPLY SUBSYSTEM DEVELOPMENT Progress Report [illegible]

[illegible] 50 p refs

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A nitrogen supply subsystem based on the dissociation of hydrazine [illegible]

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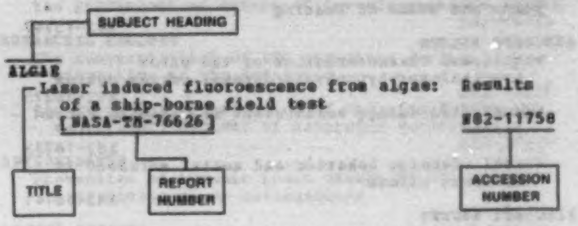

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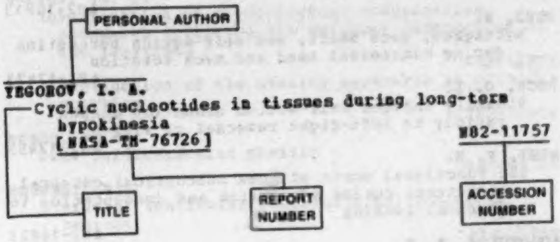

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NASA SP-7011(232)

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 232)

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1982 in**

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 437 reports, articles and other documents announced during April 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1982 Supplements.

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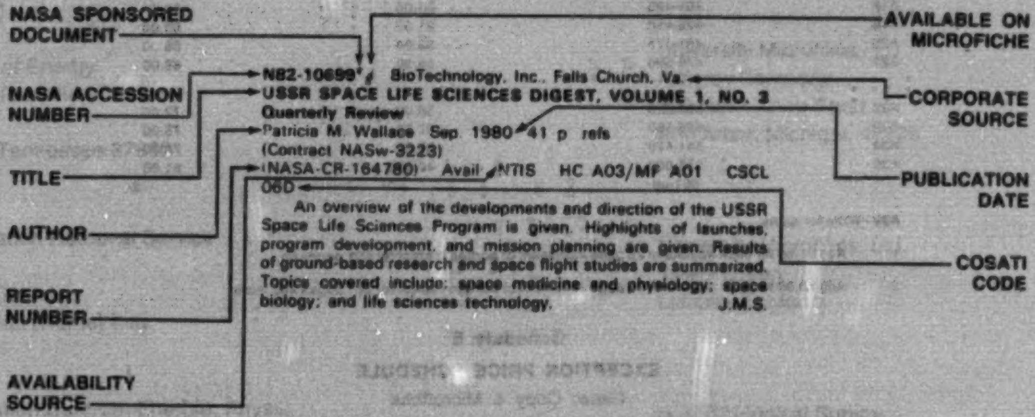

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**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3**
**Quarterly Review**
Patricia M. Wallace Sep. 1980 41 p refs
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An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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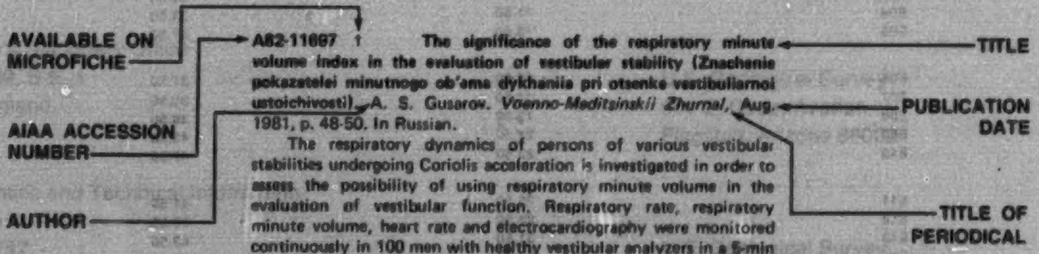

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**A82-11687 #** **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal,* Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 232)*

MAY 1982

## IAA ENTRIES

**A82-18872** † **The healthy and the diseased human brain (Zdorovyi i bol'noi mozg cheloveka).** *N. P. Bekhtereva.* Leningrad, Izdatel'stvo Nauka, 1980. 208 p. 357 refs. In Russian.

Conceptions of the physiological characteristics and interactions of the human brain are discussed based on experimental and observational data obtained over nearly two decades. Current principles and capabilities in the study of the human brain are considered, including electroencephalography, electrical stimulation and pharmacological tests, and general principles of human brain organization are reviewed particularly as regards long-term memory and the maintenance of mental activity. The impact of illness on general brain mechanisms is considered, along with the relation of brain mechanisms to the neurophysiology of the psyche in areas such as phoneme and word handling and the thinking process. Attention is also given to the neurophysiology of human memory and its electrical stimulation, and to the present and past development of human neurophysiology. A.L.W.

**A82-18877** † **Biped walking - Model problems of dynamics and control (Dvunogaia khod'ba - Model'nye zadachi dinamiki i upravleniia).** V. V. Beletskii. In: Motion stability. Analytical mechanics. Motion control. Moscow, Izdatel'stvo Nauka, 1981, p. 28-41. 16 refs. In Russian.

The literature on biped walking is reviewed with emphasis on the work of Beletskii and his colleagues. Particular consideration is given to the method of prescribed synergy, compensating oscillations, parametric optimization of the walking process, angular stabilization, stabilization algorithms, and the problem of underwater walking. B.J.

**A82-18988** † **Development of an integrated walking robot (Razrabotka integral'nogo shagaiushchego robota).** D. E. Okhotsimskii, A. K. Platonov, V. S. Gurfinkel', and E. A. Devianin. In: Motion stability. Analytical mechanics. Motion control. Moscow, Izdatel'stvo Nauka, 1981, p. 223-238. 30 refs. In Russian.

The basic principles of the functional organization of an integrated walking robot are reviewed. Attention is given to problems of motion design, the mathematical modeling of robot motion, and the development of laboratory models. B.J.

**A82-19000** **Psychological problems in the mutual adaptation of man and machine in control systems (Psikhologicheskie problemy vzaimnoi adaptatsii cheloveka i mashiny v sistemakh upravleniia).** Edited by B. F. Lomov, V. F. Venda, and Iu. M. Zabrodin. Moscow, Izdatel'stvo Nauka, 1980. 320 p. In Russian.

A systems theory and methodology is developed concerning the mutual, reciprocal adaptation of man and machine so as to optimize the informational interaction between them. Following a review of current psychological problems in the man-machine system, an approach to system optimization based on the mutual adaptation of man and machine is established. Attention is then given to the construction and modeling of processes of multilevel mutual adaptation of man and machine, and to psychological methods for the adaptation of specific man-machine systems. Methods for the modeling and optimization of adaptive man-machine systems, including autonomic-type systems and systems operating under critical conditions and based on idealized strategies for operative problems are examined, and the application of the concept of mutual adaptation between man and machine to operator training is considered. A.L.W.

**A82-19012** **Physical and physiological features of long-range flight and its impact on patients (Physikalische und physiologische Besonderheiten des Langstreckenfluges und seine Auswirkungen auf den Patienten).** K. Grossmann (Akademie des Sanitäts- und Gesundheitswesens der Bundeswehr, Munich, West Germany). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 152-162. In German.

Adverse effects on patients caused by long-range flights in ambulance aircraft are presented. Various types of acceleration and deceleration at takeoff and landing are discussed in relation to the possible adverse effects on respiratory patients. The effects of noise, temperature and aircraft humidity on patients are presented, and the optimal temperature is found to be 20-24 C, with an optimal aircraft humidity of 35%. The effects of spin, ozone, cosmic rays and changes in time zone are also discussed. D.L.G.

**A82-19014** **The reliability of flight personnel during the operation of the Mi-4 helicopter.** Y. G. Zorbas (European Institute of Environmental Cybernetics, Athens, Greece). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 177-180.

The effect of vibration and noise of an Mi-4 helicopter on the reliability of the flight personnel was examined. A study group composed of 58 Mi-4 flight personnel was divided into work-related groups which were tested for simple motor reactions, reactions to a moving object, the critical frequency of flicker fusion, the capacity for fine coordination of movements, and the reproducibility of muscular exertion. The tests were applied before and after flights for one month, and the results were compared with results from similar tests carried out on a control group manning a helicopter which had low noise and vibration levels. Significant deterioration in the performance of the tests was observed in all crewmembers on the Mi-4, and were highest among the captains, while the control group exhibited few of the performance degradations. It is noted that some of the declines in performance were cumulative, i.e. grew greater with longer times. M.S.K.

**A82-19016** **First aid for thorax traumas: Thorax drainage through suction - Report on 25 cases (Primärversorgung von Thoraxtraumen: Thoraxsaugdrainage - Bericht über 25 Fälle).** C. Biesing and A. David (Malteser-Hilfsdienst, Cologne, West Germany). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 189-191. In German.

**A82-19223** **Evaluation of maximal and submaximal static muscle exertions.** K. H. E. Kroemer (Virginia Polytechnic Institute and State University, Blacksburg, VA) and W. S. Marras (Wayne State University, Detroit, MI). *Human Factors,* vol. 23, Dec. 1981, p. 643-653. 21 refs. Contract No. F49670-79-C-0109.

A model of the regulation of muscle strength exertion is proposed. Based on the model, methods are discussed to assess whether a subject exerts maximal or submaximal efforts. Results with 40 subjects indicate that a simple technique may be developed to judge if a subject is following instructions to exert a maximal contraction in a routine test of voluntary muscle strength. (Author)

**A82-19224** **Differences in eye movement data recorded by electro-oculography and corneal reflection techniques.** J. Lehtela (Institute of Occupational Health, Helsinki, Finland). *Human Factors,* vol. 23, Dec. 1981, p. 661-665.

The techniques of electro-oculography and corneal reflection are compared as to their abilities to monitor saccades, fixations and blinks during a visual task under simulated field conditions. Electro-oculograms and video recordings of eye mark motions were obtained simultaneously in unrestrained subjects asked to trace visually patterns of circles placed 1 m away. It is found that whereas the number of blinks given by the two methods coincide quite well, the number of saccades as recorded by the corneal reflection camera was greater than that by EOG, due to the classification of some shorter saccades as involuntary microsaccades in EOG recordings. Although the exact fixation point could not be determined in the present experiment, the fixation times calculated from EOG data appear longer than those by corneal reflection. It is concluded that while the corneal reflection camera with video monitor is suitable for monitoring the visual situation, including the fixation point, EOG is more suitable for providing quantitative data about blinks, saccades and fixations. A.L.W.

**A82-19225** **Control and automatic processing during tasks requiring sustained attention - A new approach to vigilance.** A. D. Fisk and W. Schneider (Illinois, University, Champaign, IL). *Human Factors,* vol. 23, Dec. 1981, p. 737-750. 34 refs. Grant No. NIH-5-R01-MH-3125. NR Project 150-409.

Vigilance decrements are interpreted within a two-process (automatic/control) theory of human information processing, and the theoretical components of the normal vigilance curve are discussed in relation to type of processing and amount of practice. Two experiments were conducted showing significant vigilance decrements when subjects utilized effortful control processing; the normal decrement was not observed when effortless automatic processing was possible. Maximum vigilance decrements occur when subjects must continually and redundantly allocate control-processing resources. Results disconfirm the habituation hypothesis. It is concluded that structuring a task such that there is a consistent relationship between signals and noise will reduce vigilance problems. System design implications suggest that tasks should be structured to mimimize continuous and repetitive control processing. Methods for developing vigilance-decrement-resistant automatic processing are discussed. (Author)

**A82-19248** **Computer simulation as a visual aid in a video course.** G. L. Bell (Mitre Corp., McLean, VA). In: Summer Computer Simulation Conference, Washington, DC, July 15-17, 1981, Proceedings. Arlington, VA, AFIPS Press, 1981, p. 436, 437. U.S. Department of Transportation Contract No. FA80WA-4370; No. FA01-81-C-10001.

A study of the performance of controllers in the Air Traffic Control (ATC) system concluded that many controllers perform their ATC tasks in ways that leave them vulnerable to common human errors, misunderstandings, and confusions. The study team made, therefore, the recommendation that the controllers' training should include ways to compensate for basic human limitations. The Air Traffic Service has begun to follow the recommendation by adding videotape courses on ATC-operational remembering and listening. Three courses (for terminal radar, en route radar, and tower cab positions) are to be provided. Each course contains ten examples of aids used in simulated ATC situations which are often encountered by controllers. The workplace and equipment for the two courses for the radar positions is to be simulated. The radar displays in the scenarios require computer simulation. G.R.

**A82-19258** **Advanced aviation concepts evaluation through computer driven simulation.** J. Fabry and E. S. Stein (FAA, Technical Center, Atlantic City, NJ). In: Summer Computer Simulation Conference, Washington, DC, July 15-17, 1981, Proceedings. Arlington, VA, AFIPS Press, 1981, p. 659-661.

The goals and operational characteristics of FAA programs for human interactions with advanced avionics systems and displays are discussed. Flight training simulators are noted to offer realistic aircraft handling experience in a cost-effective fashion. The necessity of employing human factors personnel before the actual engineering of a system is stressed, and is a guiding concept in the operations of the FAA Advanced Concepts Laboratory. The Technology, Concepts, and World divisions of the Laboratory are outlined, and the training simulators, the Digital Avionics Control System, and the Cockpit Display of Traffic hardware are described for use by pilots and air traffic controllers. M.S.K.

**A82-19491 *** **Effects of vasopressin administration on diuresis of water immersion in normal humans.** M. Epstein, A. G. DeNunzio, and R. D. Loutzenhiser (U.S. Veterans Administration Medical Center; Miami, University, Miami, FL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1384-1387. Research supported by the U.S. Veterans Administration; Contract No. NAS9-15473.

The influence of vasopressin suppression on the diuresis encountered during water immersion is investigated in studies on normal humans immersed to the neck. Six hydrated male subjects were studied on two occasions while undergoing 6 h of immersion without or during the administration of aqueous vasopressin for the initial 4 h. Neck immersion is found to result in a significant increase in urinary flow rate beginning in the first hour and persisting throughout the immersion. The administration of vasopressin markedly attenuated the diuretic response throughout the period of infusion, while cessation of vasopressin administration during the final 2 h of immersion resulted in a marked offset of the antidiuresis. Results thus support the view that the suppression of antidiuretic hormone contributes to the immersion diuresis of hydrated subjects. A.L.W.

**A82-19492 *** **Orthostatic fluid-electrolyte and endocrine responses in fainters and nonfainters.** E. Shvartz, V. A. Convertino, L. C. Keil, and R. F. Haines (NASA, Ames Research Center, Moffett Field, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1404-1410. 39 refs.

The responses to orthostasis of fluid-electrolyte and endocrine indicators in persons subject and not subject to fainting during tilting are investigated, along with the effects of heat acclimatization and physical training on those responses. Plasma volume and electrolytes and plasma vasopressin and renin activity were determined in tilt-table tests conducted before and after an eight-day period of daily heat acclimation during exercise at 50% maximal oxygen uptake at 40 C, or a control period of exercise at 24 C. Half of the 10 subjects in the study, regardless of exercise regime, showed improved orthostatic reactions in the second tilting test, related to increases in post-tilt plasma volume and potassium concentration, particularly in the nonfainters. In the first test, plasma renin activity is observed to increase fivefold and plasma vasopressin 50 times after the transition from the supine to the orthostatic positions; the respective increases were reduced by 50 and 75% in the second test. The fainters also exhibit a greater increase in vasopressin and a lower increase in renin activity upon tilting than the nonfainters. Results indicate the orthostatic-induced vasopressin increase to be related to volume control independent of renin activity. A.L.W.

**A82-19493** **Variability of oxygen affinity of blood - Human subjects native to high altutude.** R. M. Winslow, C. C. Monge, N. J. Statham, C. G. Gibson, S. Charache, J. Whittembury, O. Moran, and R. L. Berger (Centers for Disease Control, Atlanta, GA; Universidad Particular Peruana, Lima, Peru; National Institutes of Health, Bethesda; Johns Hopkins University, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise*

*Physiology*, vol. 51, Dec. 1981, p. 1411-1416. 24 refs. NSF Grant No. INT-77-21795.

The oxygen equilibrium curves (OECs) of whole blood from high-altitude natives is measured in a study of the variability of oxygen affinity under in vivo conditions. An automated method was used to measure the entire OEC from 0 to 150 Torr under controlled pH and CO2 tension in 46 Peruvians native to high altitudes (4540 m) and 25 sea-level controls. Fits of the data with the Adair curve describing the successive oxygenation of hemoglobin reveal that at a pH of 7.4, the oxygen tension at which the hemoglobin is half saturated with O2 is significantly higher in the high-altitude population than in the controls. When the state of compensated alkalosis of the high-altitude subjects is taken into account, however, the values are found to be indistinguishable from the controls. It is concluded that the reduction in oxygen affinity of high-altitude natives is offset by the compensatory respiratory alkalosis so that the position of the OEC is close to that of sea-level humans. Considerable individual variability in oxygen affinities is noted in both groups. A.L.W.

**A82-19494** **Glycogen and nonspecific adaptation to cold.** J. LeBlanc and A. Labrie (Université Laval, Quebec, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Dec. 1981, p. 1428-1432. 14 refs.

Exposure to moderate cold for a few weeks causes adaptation through the development of nonshivering thermogenesis primarily in the brown adipose tissue. Exposure to severe cold by repeated short exposures also causes adaptation but by mechanisms that seem to be different. It was also found that this type of adaptation is nonspecific because it can be produced by other stresses such as swimming or fasting. Simultaneous determinations of glycogen in the liver and soleus and tibialis muscles indicated a possible role for this substrate in cold resistance. Repeated cold exposure, swimming for 3 h, or fasting for 48 h all reduced the glycogen stores when measured immediately after the stress. However, the levels of glycogen were significantly increased above the initial values when the determinations were made 24 h later. Cold tolerance measured by resistance to hypothermia at -5 C was improved only when the test was done 24 h after the stress had taken place. Thus, cold resistance is nonspecific and results suggest that glycogen stores could serve as a rate-limiting substrate. (Author)

**A82-19495** **Effect of blood volume on sweating rate and body fluids in exercising humans.** S. M. Fortney, E. R. Nadel, C. B. Wenger, and J. R. Bove (John B. Pierce Foundation Laboratory; Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Dec. 1981, p. 1594-1600. 32 refs. Grant No. NIH-HL-20634.

**A82-19496** **Enhanced heat production in physically restrained rats in hypoxia.** M. Hayashi and T. Nagasaka (Kanazawa University, Kanazawa, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Dec. 1981, p. 1601-1606. 27 refs.

The combined influence of hypoxia and restraint on metabolic heat production in rats is investigated. Heat production, heat loss, colonic temperature and cardiovascular activity were monitored in rats placed in individual wire mesh cages in which they could move freely or in restraint cylinders, and exposed to mixtures of 9.5% O2 in N2 gas. Hypoxic exposure is found to lead to rapid decreases in heat production and heart rate and gradual decreases in heat loss and colonic temperature in the freely moving rats, while the restrained rats exhibited increased heat production, heat loss, colonic temperature and heart rate. The increases are reversed in restrained chemically sympathectomized rats treated with 6-hydroxydopamine hydrobromide, while norepinephrine is observed to lead to increases in heat production and heart rate in freely moving rats. Hypoxia is also found to decreace significantly blood flow to the brown adipose tissues in restrained rats while increasing blood flow to the heart, diaphragm and limb muscles. Results suggest that hypermetabolism in restrained rats during hypoxia is due to increased neurosympathetic activity, with increased muscle metabolism. A.L.W.

**A82-19497** **Alterations in responses to drugs of atria from white rats acclimated to hypobaric hypoxia.** M. J. Hughes, M. T. Kopetzky, F. Masiha, K. Light, and C. D. Barnes (Texas Tech University, Lubbock, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Dec. 1981, p. 1607-1611. 33 refs. Grant No. NIH-HL-16240.

Changes in ion responses and in drug sensitivities of cardiac muscles of animals adapted to simulated high altitude conditions are investigated. Atria isolated from young male Wistar rats acclimated to a simulated altitude of 6000 m and from control rats were observed under normoxic conditions. The spontaneous rate of atria isolated from altitude-acclimated rats is found to be significantly lower than that of atria from the control animals. While neither group of tissues responded to the administration of ouabain, the altitude-adapted atria showed a greater sensitivity to both pentobarbital sodium and to ethanol, which stopped spontaneous activity at lower doses than in the control animals. The acclimated atria are found to be less sensitive, however, to norepinephrine and to exhibit a smaller chronotropic response and a greater inotropic response to increased concentrations of calcium. The data obtained are thus indicative of changes in tissue metabolism similar to those found in newborn animals. A.L.W.

**A82-19498** **Breath-by-breath measurement of true alveolar gas exchange.** W. L. Beaver, N. Lamarra, and K. Wasserman (California, University, Medical Center, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Dec. 1981, p. 1662-1675. 15 refs.

A method has been developed for the on-line estimation of breath-by-breath alveolar gas exchange from measurements of gas exchange at the mouth corrected for changes in functional residual capacity and alveolar gas concentration. The algorithms employed calculate alveolar O2 and CO2 gas exchanges from the alveolar O2, CO2 and N2 concentrations at end of expiration, the volume containing the lung gas stores at end of expiration and the breath-to-breath change in this volume. Error sensitivity analysis indicates the effects of inaccuracies due to measurement errors to be similar in magnitude to those found in the conventional open-circuit method. Direct comparisons between the alveolar gas exchange measured by the present method and according to the open-circuit assumption that inspired and expired N2 volumes are equal, in subjects exercising at various work rates reveals the presence of significant breath-to-breath differences in gas exchange, particularly during metabolic and respiratory transients, which may have a significant influence in the interpretation of the underlying physiology. A.L.W.

**A82-19808** **Psychophysical evidence for more than two kinds of cone in dichromatic color blindness.** F. S. Frome, T. P. Piantanida, and D. H. Kelly (SRI International, Menlo Park, CA). *Science*, vol. 215, Jan. 22, 1982, p. 417-419. 11 refs. Grants No. NIH-EY-02357; No. NIH-EY-01128.

Psychophysical evidence shows that at least some classically diagnosed dichromats have three cone types rather than two. The anomalous cones, previously thought to be absent, are less sensitive than normal cones to both spectral and temporal variations, and have spectral sensitivities like those of the abnormal cones of anomalous trichromats. These results are not consistent with either loss or replacement models of X-linked recessive color-vision defects, since some dichromats apparently have the same three photopigments as anomalous trichromats. (Author)

**A82-19743** # **Staying sane in space.** B. J. Bluth (California State University, Northridge, CA). *Mechanical Engineering*, vol. 104, Jan. 1982, p. 24-29. 35 refs.

With a view to the establishment of procedures and techniques that will help crews adapt to long missions aboard the projected NASA Space Operations Center, in which nine persons will live for between three and six months, a historical study is made of confined crew performance in isolated environments. Attention is also given to Soviet long-duration mission crew experience. Among the confined, isolated and stressful precedents surveyed are Antarctic research teams, submarine crews, the operators of oceanographic research vessels and undersea research laboratories, and trainees in specially designed simulators. It is generally found that personality screening prior to confinement did not accurately predict subsequent behavior, with irritability increasing as the mission progressed. NASA and

Soviet screening and training procedures are described, with recommendations for crew compartment design. O.C.

**A82-19746** † **Brain monoamine oxidase activity during cold adaptation and under the combined effects of cold and hyperbaric oxygenation (Aktivnost' monoaminoksidaz mozga pri kholodovoi adaptatsii i sovmestnom deistvii kholoda i giperbarooksigenatsii).** I. A. Goroshinskaia, L. L. Grabovskova, Z. G. Bronovitskaia, and A. A. Krichevskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1611-1616. 20 refs. In Russian.

**A82-19747** † **The role of extracellular $O_2$ and $CO_2$ tensions in membrane mechanisms of cerebral arterial smooth muscle regulation (Rol' P/$O_2$/ i P/$CO_2$/ vnekletochnoi sredy v membrannykh mekhanizmakh reguliatsii gladkikh myshts arterii golovnogo mozga).** A. L. Azin (Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1652-1660. 20 refs. In Russian.

**A82-19748** † **The temperature dependence of the kinetics of isometric myocardium relaxation (Temperaturnaia zavisimost' kinetiki izometricheskogo rasslableniia miokarda).** V. Ia. Izakov, B. L. Bykov, and I. Ia. Kimmel'man (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1670-1675. 11 refs. In Russian.

The dependence of the exponential decay constant expressing the isometric relaxation of the myocardium on temperature is investigated in animals with various specific contents of myocardial sarcoplasmic reticulum. Experiments were performed on cardiac ventricles and atria isolated from rabbits, frogs and turtles and electrically stimulated to produce maximal contraction at temperatures from 10 to 35 C. Arrhenius plots derived from the data are found to be linear in the myocardia of the rabbit and frog, with a greater activation energy for the relaxation found in the rabbit. The Arrhenius plot for the turtle, which has a sarcoplasmic reticulum content intermediate between those of the frog and rabbit, corresponds to two straight lines with different activation energies. Results thus support the hypothesis of two seperate mechanisms of calcium removal, involving the sarcoplasmic reticulum and cellular membrane, in muscle relaxation. A.L.W.

**A82-19749** † **The influence of muscular work on the vestigial effects of cold acclimation (Vliianie myshechnoi raboty na sledovnye effekty kholodovoi akklimatsii).** V. I. Sobolev and G. I. Chirva (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1710-1716. 17 refs. In Russian.

The persistence of the vestigial effects of long-term cold acclimation and the effects of regular muscular work on these effects are investigated in studies on male albino rats preliminarily exposed to a temperature of 2 C for 28 days. Measurements of the calorigenic effect of noradrenaline, cold tolerance at -25 C, the level of working hyperthermia and organ and tissue weights were performed on the first, tenth, 20th, and 30th days of the post-acclimation period in control rats and rats performing 50 min of treadwheel exercise daily. Results indicate noradrenaline-dependent thermogenesis to be the most persistent effect of long-term cold acclimation. Muscular activity is found to accelerate the process of deacclimation due to its effects on physical, and then chemical, thermoregulation. A.L.W.

**A82-20016** * **Rates of fixation by lightning of carbon and nitrogen in possible primitive atmospheres.** W. L. Chameides (Georgia Institute of Technology, Atlanta, GA) and J. C. G. Walker (Michigan, University, Ann Arbor, MI). *Origins of Life,* vol. 11, Dec. 1981, p. 291-302. 35 refs. Grant No. NAG1-85; Contract No. NAGW-176.

A thermochemical-hydrodynamic model of the production of trace species by electrical discharges has been used to estimate the rates of fixation of C and N by lightning in the primitive atmosphere. Calculations for various possible mixtures of $CH_4$, $CO_2$, CO, $N_2$, $H_2$, and $H_2O$ reveal that the prime species produced were probably HCN and NO and that the key parameter determining the rates of fixation was the ratio of C atoms to O atoms in the atmosphere. Atmospheres with C more abundant than O have large HCN fixation rates, in excess of 10 to the 17th molecules/J, but small NO yields. However, when O is more abundant than C, the NO fixation rate approaches 10 to the 17th molecules/J while the HCN yield is small. The implications for the evolution of life are discussed. (Author)

**A82-20017** **New data on abiogenic synthesis of prebiological compounds in volcanic processes.** N. E. Podkletnov and E. K. Markhinin (Akademiia Nauk SSSR, Institut Vulkanologii, Petropavlovsk-Kamchatskiy, USSR). *Origins of Life,* vol. 11, Dec. 1981, p. 303-315. 13 refs.

Volcanoes were deduced to be high-productive generators of complex organic compounds. Ash-gas clouds produced by volcanic eruptions can be considered as many-kilometer chemical reactors with a wide range of temperatures and pressures, powerful electric discharges and a large catalytic surface. In the eruption products investigated, nitrogen-containing components of nucleic acids of uracil type, metal complexes of porphyrins and porphyrins in the metal-free form and polycyclic aromatic hydrocarbons have been found. In all, 64 carbon-containing compounds have been identified in the volcanic juvenile ash and in volcanic bombs and 13 groups of carbon-containing compounds whose composition is yet unidentified have been found. (Author)

**A82-20018** **Amino acids derivatives synthesis from nitrogen, carbon and water by electric discharges.** Y. Yamagata, Y. Kusano, and K. Inomata (Kanazawa University, Kanazawa, Japan). *Origins of Life,* vol. 11, Dec. 1981, p. 317-320. 9 refs.

**A82-20019** * **The radiolysis and radioracemization of amino acids on silica surfaces.** W. A. Bonner (Stanford University, Stanford, CA) and R. M. Lemmon (California, University, Lawrence Berkeley Laboratory, Berkeley, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 321-330. 25 refs. Research supported by the U.S. Department of Energy; Grant No. NGL-06-020-582.

Results are presented of experiments on the radioracemization of amino acids in the presence of silica surfaces such as may have been found on the prebiotic earth. L-leucine and a DL-leucine mixture deposited on samples of 1-quartz and an amorphous silica preparation (Syloid 63) was subjected to Co-60 gamma-ray irradiation, then analyzed by gas chromatography to determine the radiolysis and racemization rates. The quartz surface is found to have a marginal efficacy in enhancing radiolysis when compared with a crystalline L-leucine control, although enhancing radioracemization symmetrically by a factor of two. Both the radiolysis and radioracemization of L-leucine and DL-leucine on a Syloid-63 silica surface are observed to increase with increasing radiation dose, and to be substantially greater than in the crystalline controls. Additional experiments with the nonprotein amino acid isovaline deposited on Syloid 63 confirm the greater radiolysis susceptibility of amino acids deposited on silica with respect to the crystalline state, although racemization is not observed. The observations suggest that the presence of a silica surface would have a deleterious effect on any mechanism for the origin of molecular chirality relying on stereoselective beta-radiolysis. A.L.W.

**A82-20020** * **A model for the enantiomeric enrichment of polypeptides on the primitive earth.** N. E. Blair and W. A. Bonner (Stanford University, Stanford, CA). *(College Park Colloquium on Chemical Evolution, 5th, University of Maryland, College Park, MD, Oct. 31, 1980.) Origins of Life,* vol. 11, Dec. 1981, p. 331-335. 24 refs. Grant No. NGL-05-020-582.

A potential model is presented for the origin of optical activity in polypeptides on the primitive earth due to enantiomeric enrichment in succeeding polymerization-hydrolysis cycles. The model was developed in experiments with the polymerization of a DL-leucine N-carboxyanhydride mixture with a 31.2% enantiomeric excess of the L isomer with sodium methoxide initiator to yield a polyleucine product which was in turn partially hydrolyzed by acid. The polymerization-hydrolysis was found to produce a net 23.8% increase in the enantiomeric excess of the remaining unhydrolyzed polypeptide (14.2% from the polymerization and 9.6% from the partial hydrolysis). On the basis of these results, it is suggested that a slight excess produced by an appropriate chiral physical process may be enhanced by cycles of stereoselective polymerization and hydrolysis driven by fluctuating wet and dry environmental cycles on the primitive earth. A.L.W.

**A82-20021 *** **Search for effect of longitudinally polarized protons on optically active amino acids.** R. M. Lemmon, H. E. Conzett (California, University, Lawrence Berkeley Laboratory, Berkeley, CA), and W. A. Bonner (Stanford University, Stanford, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 337-341. 14 refs. Contract No. W-7405-eng-48; Grant No. NGL-05-020-582.

The influence of irradiation by longitudinally polarized protons on the differential decomposition of amino acid is investigated in a test of the Vester Ulbricht hypothesis that L-amino acids were produced in preference to the D isomers on the primitive earth due to the effects of parity violation in beta decay. Samples of DL-leucine were irradiated with protons of both positive and negative longitudinal polarization, then analyzed by gas chromatography. Despite advantages of higher polarization, lower velocity and higher ionization density of protons with respect to electrons, proton irradiation is found to lead to no detectable asymmetries in DL-leucine degradation, even at 50% gross degradation. A.L.W.

**A82-20022** **Origin of translation - The hypothesis of permanently attached adaptors.** S. Tyagi (Jawaharlal Nehru University, New Delhi, India). *Origins of Life,* vol. 11, Dec. 1981, p. 343-351. 29 refs.

A mechanism is proposed for the prebiotic translation of polynucleotides into a sequence of amino acids fulfilling the function of a template-dependent nucleotide polymerase, based on the permanent attachment of adaptors (tRNA) to nucleic acid molecules. The mechanism postulates the existence of a primal tRNA with an acceptor system bearing the amino acid located near the anticodonic region, and with regions capable of associating with neighboring primal tRNAs as well. The messenger-tRNA complex thus formed would be capable of high fidelity translation with a small degree of amino acid-anticodon specificity without the need for ribosomes or aminoacyl synthetases. Structural evidence supports the possibility of inter-primal-tRNA associations, and thermodynamic constraints are compatible with the hypothesis. The approximate date of occurrence of the proposed system is also consistent with the period of occurrence of the earliest organisms with ribosomes. A.L.W.

**A82-20023** **A theory of the origin of life.** C. B. Olson (Stanford University, Stanford, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 353-368. 28 refs.

A theory is developed for the functioning of the processes essential to life in the primordial earth environment and the evolution of the primordial translation apparatus. Mechanisms are proposed regarding the supply of the energy required for biological transfer reactions from activated compounds, nucleic acid replication by single template-directed bond formation and cell retention and division by environmental factors. The evolution of the nucleic acid replication process to include the synthesis of enzymes facilitating replication is explained by the formation of a transfer nucleic acid which acted to catalyze the transfer of activated amino acids to accessible amino groups. Successive steps in evolution are characterized by an increase in the number of amino acids linked together, and the appearance of a messenger nucleic acid to specify the composition and sequence of the amino acids. Ribosomes would arise acting to improve the translation apparatus as it became more complex. Finally, it is proposed that the present genetic code evolved by a process of codon length refinement. A.L.W.

**A82-20024** **A neutral theory of biogenesis.** A. Ferracin (Policlinico Umberto I, Rome, Italy). *Origins of Life,* vol. 11, Dec. 1981, p. 369-385. 170 refs.

The selective Darwinian theory of chemical evolution is critically reviewed and the tentative conclusion is reached that neither the theoretical analyses nor the experiments with phages can really prove it. An alternative proposal is put forth which considers the possibility that the biogenetic process has been driven by stochastic forces, e.g. it took place in the absence of Darwinian selection which, in turn, started only when the first protocells came into existence. The dynamics of the early self-organization of living structures should be understood in terms of self-assembly. The complexification of living matter is thus not represented as a gradual phenomenon but as a series of abrupt and relatively fast transitions consisting in the aggregation of pre-systems which had evolved by their own. The shift towards new and variegated states proposed by the bifurcation theory are not considered particularly relevant for reasons reported in the text, nor is it believed that dissipation can entirely account for the order observed in living cells. (Author)

**A82-20025 *** **Could life have evolved in cometary nuclei.** A. Bar-Nun (Tel Aviv University, Tel Aviv, Israel), A. Lazcano-Araujo (Universidad Nacional Autónoma de México, Villa Obregón, Mexico), and J. Oró (Houston, University, Houston, TX). *Origins of Life,* vol. 11, Dec. 1981, p. 387-394. 66 refs. Research supported by the Consejo Nacional de Ciencia y Tecnologia of México; Grant No. NGR-44-005-002.

The suggestion by Hoyle and Wickramasinghe (1978) that life might have originated in cometary nuclei rather than directly on the earth is discussed. Factors in the cometary environment including the conditions at perihelion passage leading to the ablation of cometary ices, low temperatures, the absence of an atmosphere and discrete liquid and solid surfaces, weak cometary structure incapable of supporting a liquid core, and radiation are presented as arguments against biopoesis in comets. It is concluded that although the contribution of cometary and meteoritic matter was significant in shaping the earth environment, the view that life on earth originally arose in comets is untenable, and the proposition that the process of interplanetary infection still occurs is unlikely in view of the high specificity of host-parasite relationships. A.L.W.

**A82-20146** **The biological effects of low-level ionizing radiation.** A. C. Upton (New York, University, New York, NY). *Scientific American,* vol. 246, Feb. 1982, p. 41-49.

The hazard to human health posed by low levels of ionizing radiation from natural and artificial sources is discussed. The natures of the natural background radiation and man-made radiation sources are considered, and carcinogenic and heritable effects are identified as the principal health hazards associated with small doses of radiation. The mechanisms of the cell damage by radiation with low and high rates of linear energy transfer are examined, with particular emphasis on damage to DNA resulting in chromosomal abnormalities. It is pointed out that the frequency of chromosomal aberrations increases linearly with radiation dose in the low to intermediate range for both low and high energy transfer radiation, however increases more quickly at high doses for the low transfer radiation. Studies of the dose-mutation rate relationship in mice and humans are discussed which indicate that the dose required to double the human mutation rate lies between 0.2 and 2.5 sieverts, along with studies of cancer incidence rates which indicate the total excess of cancers of all types to be from 4 to 18/year per 10,000 people per sievert. The relatively low risk associated with low levels of ionizing radiation is discussed in relation to public perceptions and the concept of acceptable risk. A.L.W.

**A82-20257 *** **Survival in space.** B. Webbon (NASA, Ames Research Center, Moffett Field, CA). *Natural History,* vol. 90, Dec. 1981, p. 50-57.

The evolution of space suit design to meet the needs of past and future manned space missions is discussed. Following a brief consideration of the purposes of the space suit in providing an artificial atmosphere and protection from environmental hazards, attention is given to the first high-altitude suits developed in the 1930's for the protection of balloon pilots, and for high-altitude airplane flights. The Mercury project space suit is presented as essentially similar to those for high-altitude military aircraft developed since World War II, providing pressurization and oxygen as a backup to the capsule systems. Modifications to the suit allowing it to be worn without discomfort during work outside the spacecraft, which were stimulated by experience in Gemini missions, are considered, which culminated in the suits of the Apollo and Skylab programs which provided insulation, cooling and life support for periods of up to eight hours. Finally, changes to suit design made necessary by the increasing numbers of men and women to perform Space Shuttle flights and space construction operations are considered. A.L.W.

**A82-20301 †** **Investigation of the otolithic membrane of the utricle of the guinea pig (Issledovanie otolitovoi membrany utrikulusa morskoi svinki).** Ia. A. Vinnikov, D. V. Lychakov, K. A. Koichev, A. Boiadzhieva-Mikhailova, I. Khristov, and E. A. Lavrova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR; Meditsinska Akademiia, Pleven; B'lgarska Akademiia na Naukite, Institut po Morfologiia, Sofia, Bulgaria). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii*, vol. 17, Sept.-Oct. 1981, p. 474-479. 16 refs. In Russian.

A study is presented of the structure and composition of the guinea pig otolithic membrane at various stages of development. The scanning and transmission electron microscopy reveal several morphological classes of otoconia, the most common being smooth, transitional and rough otoconia, with rhombohedral shapes less frequently encountered. The smooth and rough otoconia appear to be independent morphological forms, with transition from one type to the next not taking place and the numerical ratio between them not changing over course of development. The mean sizes of the otoconia are observed to increase only during embryological development. A linear relation is found between otoconial length and diameter. Chemical analysis reveals the presence of small amounts of Na and Mg in addition to Ca, and trace amounts of Cs in the membrane; the chemical composition does not change in the course of development. The results may be used in the study of the effects of prolonged weightlessness on the vestibular apparatus of vertebrates. A.L.W.

**A82-20302 † Some indicators of carbohydrate metabolism in rat lung during repeated and chronic hypoxia (Nekotorye pokazateli uglevodnogo obmena v legkikh krys pri povtornoi i khronicheskoi gipoksii).** N. N. Pribylova (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR). *Voprosy Meditsinkoi Khimii*, vol. 27, Sept.-Oct. 1981, p. 634-636. 26 refs. In Russian.

The effects of prolonged chronic exposure to hypoxia on carbohydrate metabolism in the rat lung are investigated. Determinations of glucose and glycogen levels, proteins, lactate and pyruvate concentrations and hexokinase and lactate dehydrogenase activities were made in male and female rats following 7 and 36 days of 6-hr exposures to a simulated altitude of 9000 m. The 7-day exposures are found to be accompanied by increases in lactic acid concentrations and the lactate/pyruvate ratio and reductions in glycogen levels, indicative of the activation of the glycolitic pathway in the lung. A reduction in hexokinase activity is observed associated with the increased glucose, possibly due to an increase in glucocorticoid secretion. The decrease in hexokinase activity and increase in glucose content are observed to be more marked in the females than in the males during both stages of hypoxia, which may explain the greater hypoxia tolerance of females. With longer exposure to hypoxia, it is observed that lung glycogen stores are depleted, and glucose levels increase paralleled by a drop in hexokinase activity. A.L.W.

**A82-20303 † Physiology and pathology of respiration and means of correcting oxygen deficiencies in an organism /Meeting of the Interdepartmental Commission on the Coordination of Studies in Medicine of the Academy of Sciences of the Ukrainian SSR and the Ministry of Health of the Ukrainian SSR/ (Fiziologiia i patologiia dikhannia ta zasobi korektsii staniv kisnevogo goloduvannia organizmu /Narada Mizhvidomchoi Komisii po Koordinatsii Doslidzhen' u Galuzi Meditsini AN URSR i MOZ URSR/).** M. M. Seredenko. *Akademiia Nauk Ukrains'koi RSR, Visnik*, vol. 45, Aug. 1981, p. 86. In Ukrainian.

**A82-20304 † EEG description algorithm for use in clinical practice and studies of work capacity (Algoritm opisaniia EEG dlia ispol'zovaniia v klinicheskoi praktike i ekspertize trudosposobnosti).** A. G. Povorinskii, V. A. Zabolotnykh, and N. N. Lebedeva (Leningradskii Institut Ekspertizy Trudosposobnosti i Trudoustroistva Invalidov; Leningradskii Institut Usovershenstvovaniia Vrachei-Ekspertov, Leningrad, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova*, vol. 81, no. 8, 1981, p. 1130-1133. In Russian.

An EEG description algorithm based on the quantitative assessment of the bioelectric activity of the brain is proposed. In describing a given rhythm, attention is given to its distribution, pattern, degree of distortion by other signals, the presence of generalized manifestations, and local outbreaks and paroxysms. The algorithm includes a description of the orientation reaction, responses to rhythmic and trigger photostimulation, hyperventilation, and pharmocological loads. The algorithm makes a more complete use of EEG information and can serve as the basis of special-purpose computer programs. B.J.

**A82-20305 † The effect of the motor activity regime on the development, conservation, and regeneration of defensive conditioned reflexes in rats (Vliianie rezhima dvigatel'noi aktivnosti na vyrabotku, sokhranenie i vosproizvedenie oboronitel'nykh uslovnykh refleksov u krys).** N. G. Zhuravleva and Iu. G. Shirokov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Sept.-Oct. 1981, p. 790-793. 12 refs. In Russian.

**A82-20306 † The influence of some triterpenic glycosides on C-14-alanine inclusion into the bone-marrow cells of rats (Vliianie nekotorykh triterpenovykh glikozidov na vkliuchenie C-14-alanina v kletki kostnogo mozga krys).** N. G. Prokof'eva, Iu. N. Loenko, and M. M. Anisimov (Akademiia Nauk SSSR, Tikhookeanskii Institut Bioorganicheskoi Khimii, Vladivostok, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Sept.-Oct. 1981, p. 794-797. 20 refs. In Russian.

**A82-20307 † Acute experimental emotional stress in rabbits in a modulated electromagnetic field (Ostryi eksperimental'nyi emotsional'nyi stress u krolikov v usloviiakh modulirovannogo elektromagnitnogo polia).** A. V. Gorbunova, N. V. Petrova, V. V. Portugalov, and S. K. Sudakov (Akademiia Nauk SSSR, Institut Normal'noi Fiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Sept.-Oct. 1981, p. 774-780. 15 refs. In Russian.

The effects of a modulated electromagnetic field on the state of emotional stress induced by alternating or combined stimulation of the ventromedial nuclei of the hypothalamus and electrocutaneous stimulation are investigated in rabbits. Experimentally stressed animals and unstressed, restrained controls, were placed in a field of intensity 30 V/m, carrier frequency 30 mHz and modulation frequency 7 Hz, and arterial pressure and heart rate, water soluble protein levels in various extramural autonomic and sympathetic ganglia, and lactate dehydrogenase isoenzyme spectra were determined. Application of the modulated electromagnetic field is found to reduce the number of rabbits susceptible to the harmful effects of stresses, as well as reverse the decrease in protein content and eliminate the tendency towards increased aerobic metabolism in the cardiac conductive system. The stressed rabbits in the electromagnetic field also exhibited slightly greater activities of the fast LDH fractions in the superior cervical, stellate and nodose ganglia. A.L.W.

**A82-20308 † The functional condition of the ampullar apparatus in Meniere's disease (Funktsional'noe sostoianie ampuliarnogo apparata pri bolezni Men'era).** Z. I. Munchaev, A. O. Radzhabov, and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii*, July-Aug. 1981, p. 7-9. 20 refs. In Russian.

The functional characteristics of Meniere's disease are investigated in tests involving graded threshold and subthreshold stimulation of the ampullar receptors. Clinical examination of 50 patients reveals the disease to be characterized by a definite sequence of injury to inner ear receptors, in the first stages involving the cochlea and ampulla and in the final stage the sacculus vestibuli. It is found that the longer a patient has had the disease, the greater are the chances for the second ear to be affected. Threshold stimulation studies on a rotating chair reveal a decline in vestibular function, progressing with the duration of the disease. Vestibular recruitment was discovered in 73% of the cases. A.L.W.

**A82-20309 † Vestibular responses of neurons in the feline anterior suprasylvian gyrus and their interaction with responses to acoustic and facial stimuli (Vestibuliarnye reaktsii neironov perednei suprasil'vievoi oblasti kory koshki i ikh vzaimodeistvie s reaktsiiami na zvukovoe razdrazhenie i razdrazhenie litsevogo nerva).** V. S. Dem'ianenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia*, vol. 13, no. 4, 1981, p. 353-358. 9 refs. In Russian.

**A82-20310 † Laws governing readaptation for seamen after a low-latitude cruise (Nekotorye zakonomernosti protsessa readaptatsii u moriakov posle plavaniia v nizkikh shirotakh).** V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 50-52. In Russian.

A82-20311 † **Natural resistance of the organism of seamen during postcruise rest (Estestvennaia rezistentnost' organizma moriakov vo vremia poslepokhodovogo otdykha).** V. S. Novikov. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 51, 52. 8 refs. In Russian.

A82-20312 † **Deontology in the practice of otorhinolaryngology (Deontologiia v praktike otorinolaringologa).** N. G. Chichkin. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 54, 55. In Russian.

A82-20313 † **Functional condition and work capacity under mountain conditions (Funktsional'noe sostoianie organizma i rabotosposobnost' v gornykh usloviiakh).** I. D. Kudrin, R. N. Korobov, V. A. Mozin, and V. A. Ivanov. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 45-47. 7 refs. In Russian.

The dynamics of changes in human functional condition and work capacity during the process of adaptation to middle (2200-2400 m) and high (3200-3400 m) altitudes is investigated. In persons not previously adapted to hypoxia, altitude exposure is found to lead to decreases in work capacity as measured by the accuracy of visual-motor responses, and in the quality and tempo of professional activities, particularly those connected with intense physical exercise. Fatigue is found, accompanied by an impairment in cardiovascular and respiratory capacities. These changes in functional condition and work capacity are noted to be especially marked in the 7 days following ascent to altitude, and to persist for at least 2 months. A.L.W.

A82-20314 † **Frequency characteristics of visual evoked potentials in different regions of the human cerebral cortex (Osobennosti chastotnoi struktury vyzvannykh potentsialov na svet v razlichnykh otdelakh kory bol'shogo mozga cheloveka).** G. A. Shchekut'ev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) and Iu. M. Koptelov (Akademiia Nauk SSSR, Institut Problem Upravleniia, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, July-Aug. 1981, p. 845-847. 8 refs. In Russian.

A82-20315 † **Electroencephalographic correlates of the differentiation between verbal stimuli during natural night sleep in humans (Elektroentsefalograficheskie korreliaty razlicheniia slovesnykh razdrazhitelei vo vremia estestvennogo nochnogo sna cheloveka).** E. K. Arons and V. M. Vasil'eva (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, July-Aug. 1981, p. 839-841. 9 refs. In Russian.

A82-20316 † **The effects of narcotic analgesics on animal sensitivity to hypoxia (Vliianie narkoticheskikh anal'getikov na chuvstvitel'nost' zhivotnykh k gipoksii).** B. G. Volynskii, L. A. Martynov, and N. S. Solun (Saratovskii Meditsinskii Institut, Saratov, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 65-68. 14 refs. In Russian.

A comparative study is presented of the effects of morphine and promedol on the sensitivity of the mouse to hypoxic hypoxia and the state of glycolysis under conditions of oxygen insufficiency. Determinations of blood glucose, lactate, pyruvate and excess lactate levels, redox potentials, free energy and lactate dehydrogenase isoenzyme activities were performed in animals injected with 25 mg/kg morphine or promedol and exposed to a stimulated altitude of 10 km for 1 hour. Whereas morphine had no effect on survival relative to uninjected controls, promedol is observed to increase mortality from 55 to 72%. These differences are reflected in the effects of the two drugs on carbohydrate metabolism, with morphine leading to increases in blood pyruvate, redox potential and free energy, creating favorable conditions for the oxygen utilization, which are not found with promedol. Analysis of lactate dehydrogenase isoenzyme distributions reveals that promedol favors the final stage of glycolysis in organs with aerobic metabolism, while morphine favors it in anaerobic organs. Finally, observations that adrenalin does not induce an elevation in blood sugar levels are noted as evidence for the depletion of glycogen and glucose stores. A.L.W.

A82-20317 † **Special and clinical physiology of hypoxic states (Spetsial'naia i klinicheskaia fiziologiia gipoksicheskikh sostoianii).** M. M. Filippov. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 91, 92. In Russian.

The conference on the special and clinical physiology of hypoxic states held in October 1979 at the Bogomol'tz Institute of Physiology in Kiev is briefly described. Particular consideration is given to the new classification of hypoxic states proposed by Kolchinskaia. B.J.

A82-20318 † **The measurement of oxygen and carbon dioxide partial pressures in tissues by the gas depot method (Izmerenie partsial'nogo napriazheniia kisloroda i uglekislogo gaza v tkaniakh organizma po metodu gazovogo depo).** V. L. Popkov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 67-69. 6 refs. In Russian.

The use of the gas depot method of Campbell (1929) and Van Liew (1962) in the determination of the partial pressures of oxygen and carbon dioxide in the tissues of an organism is discussed. The method involves the introduction of a gas of any composition into a tissue so that a gas cavity is formed which eventually comes into equilibrium with the gases in the surrounding tissue, followed by the extraction and analysis of cavity gases. The slow response time of the method makes it most suitable for studies of long duration, such as experiments on acclimatization over several months to altitude hypoxia, the effects of hypoxic, hypercapnic and hyperoxic breathing mixtures over several hours or days and prolonged hypergravity, where the responses of polarographic electrodes become unstable. The gas depot method may also be used in studies of the tensions of N2 and other gases dissolved in body tissues. A.L.W.

A82-20319 † **Elevation of hypoxia resistance with the use of gutimine (Povyshenie rezistentnosti k gipoksii s pomoshch'iu gutimina).** V. M. Vinogradov, L. V. Pastushenkov, and E. N. Sumina. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 81-85. 43 refs. In Russian.

Experimental data demonstrating the protection from the adverse effects of hypoxia offered by the antioxidant gutimine and its analogs is presented. The experiments included preliminary studies of hypoxia resistance and recovery under simulated altitude, studies of circulatory hypoxia in the brain and in intrauterine fetuses, studies of myocardial ischemia during acute and chronic experiments and studies where cardiac, kidney and limb circulation is cut off. The compound was also found to be effective in cases of hemorrhagic hypotension, complex hypoxia in peritonitis, meningococcal meningitis, and the weakening of uterine muscle contractility during prolonged deliveries, and in cranial-cerebral trauma. Mechanisms of the antihypoxic action of gutimine and its analogs have been found to include the reduction of oxygen utilization, the activation of aerobic and anaerobic metabolism, the acceleration of lactate utilization, the inhibition of lipolysis in fat tissue, and stabilization of cell membranes. Clinical observations also support the experimental data. A.L.W.

A82-20320 † **The influence of adaptation on the periodic effect of hypoxia on the poststress activation of the primary immune response (Vliianie adaptatsii k periodicheskomu deistviiu gipoksii na poststressornuiu aktivatsiiu pervichnogo immunnogo otveta).** G. T. Sukhikh, B. A. Frolov, and F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow; Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 73-77. 8 refs. In Russian.

The present work studies the influence of emotional-pain stress (EPS) on the primary immune response and lymphocyte blast transformation (LBT) in Wistar rats adapted or nonadapted to the periodic effect of hypoxia. It is found that EPS in nonadapted animals caused intensification of the immune response, manifested in the number of antibody-producing cells (ABPC). The LBT indices did not change significantly in such cases. In animals adapted to the periodic effect of hypoxia the total force of the immune response increased but the formation of ABPC was delayed and their relative and absolute maximum values were reached on the eighth and not the fifth day after immunization. The LBT was reduced by 33.4-52.4% as compared with that in nonadapted animals. B.J.

A82-20321 † **A combined method for the study of tissue respiration under conditions corresponding to natural gas homeo-**

stasis (Kombinirovannyi metod issledovaniia tkanevogo dykhaniia v usloviiakh estestvennogo gazovogo gomeostaza). E. S. Mailian, E. A. Kovalenko, and L. B. Buravkova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1981, p. 85-87. 6 refs. In Russian.

A method based on a combination of the Warburg flask with a polarographic electrode has been developed for the study of tissue respiration which enables the oxygen tension in the incubation medium to be maintained at levels corresponding to those in the in vivo tissue. The polarographic electrode placed in the flask is used to monitor the oxygen tension in the incubation medium, while the manometer of the Warburg apparatus measures the respiration rate under the prescribed oxygen tension. The combined method has been used to measure tissue respiration in rats following exposure to slowly increasing hypoxia and to combined hypoxia and hypercapnia. When compared to experiments performed in air, the variations in the oxygen consumption of brain tissue homogenates taken from animals at three stages of hypoxia exhibit more marked variation, becoming greatest at the second stage (70-60 mm Hg). A.L.W.

**A82-20322** † **Contractile dysfunction of vascular wall smooth muscle under emotional nociceptive stress (Narushenie sokratitel'noi funktsii gladkoi myshtsy sosudistoi stenki pod vliianiem emotsional'no-bolevogo stressa).** F. Z. Meerson, M. I. Gurevich, S. A. Bershtein, A. I. Solov'ev, V. A. Saltykova, and O. V. Baziliuk (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Kardiologiia*, vol. 21, Aug. 1981, p. 106-110. 9 refs. In Russian.

**A82-20323** † **Changes in microcirculatory flow with respiratory insufficiency (Izmeneniia mikrotsirkuliatornogo krovoobrashcheniia pri dykhatel'noi nedostatochnosti).** O. V. Aleksandrov, I. S. Ezhova, R. M. Alekhina, Iu. A. Gubin, V. N. Raibman, S. M. Larionov, I. I. Savchenkov, and A. M. Shenshina (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia*, vol. 21, Aug. 1981, p. 95-100. 15 refs. In Russian.

**A82-20324** † **Microcirculation, tolerance to physical strain, and certain homeostasis parameters in patients with angina pectoris (Mikrotsirkuliatsiia, tolerantnost' k fizicheskoi nagruzke i nekotorye pokazateli gomeostaza u bol'nykh so stenokardiei).** V. V. Anikin and V. V. Tsetsiuk (Kalininskii Meditsinskii Institut, Kalinin, USSR). *Kardiologiia*, vol. 21, Aug. 1981, p. 92-95. 6 refs. In Russian.

**A82-20325** † **Models of a functional lapse in one hemisphere and of the neuropharmacological effects on the deep structures of the brain (Modeli funktsional'nogo vykliucheniia odnogo polushariia i neirofarmakologicheskikh vozdeistvii na glubokie struktury mozga).** V. V. Menshutkin (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR), T. P. Suvorova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), and L. Ia. Belonov (Psikhiatricheskaia Bol'nitsa, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 7, Sept.-Oct. 1981, p. 860-868. 23 refs. In Russian.

**A82-20326** † **The use of linear models for EEG analysis (Ispol'zovanie lineinykh modelei dlia issledovaniia EEG).** V. K. Bochkarev and A. I. Nikiforov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 7, Sept.-Oct. 1981, p. 868-879. 36 refs. In Russian.

The method of main components and the method of canonical correlations are used to study the organization of the background EEG of healthy subjects and those suffering from paranoid schizophrenia. Nonspecific forms of EEG organization are obtained which reflect the state of the activating and synchronizing mechanisms of the brain. These forms of organization were found to be informative with respect to the action of neuroleptics, and can be used in the prognosis of the effectiveness of therapy on a statistically confident level. Forms of EEG organization which correlate with psychopathological disorders are also obtained. B.J.

**A82-20327** † **The significance of airflow resistance to changes in responses to increasing hypercapnia (O znachenii rezistivnogo soprotivleniia v izmeneniiakh reaktsii na narastaiushchuiu giperkapniiu).** M. A. Pogodin, A. M. Shmeleva, and E. L. Kalacheva (Akademiia Nauk SSSR, Nauchno-issledovatel'skii Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 7, July-Aug. 1981, p. 616-622. 26 refs. In Russian.

The effects of supplementary respiratory resistance on pulmonary ventilation and inspiratory muscle work during the progressively increasing hypercapnia are investigated. Measurements of inspiratory flow velocity and intrasternal pressure and calculations of ventilation and inspiratory work were performed for awake subjects exposed to 12, 20 and 26 cm H2O/l per sec during controlled alveolar hypercapnia. Resistive loading is shown to reduce ventilatory reactions to CO2, and induce a more rapid increase in inspiratory muscle work that is not proportional to the magnitude of the increased resistance. The characteristics of the ventilatory response are indicative of cortical influences. A.L.W.

**A82-20328** † **The role of biofeedback in the adaptive regulation of pathological bioelectric brain activity (Znachenie obratnoi sviazi pri adaptivnom regulirovanii patologicheskoi bioelektricheskoi aktivnosti mozga).** A. A. Vereshchagina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and E. A. Kaidanova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 7, July-Aug. 1981, p. 579-586. 12 refs. In Russian.

**A82-20329** † **The effects of an aqueous potassium loading test on kidney function (Vliianie vodno-kalievoi nagruzochnoi proby na funktsiiu pochek).** R. I. Aizman (Novosibirskii Gosudarstvennyi Pedagogicheskii Institut, Novosibirsk, USSR). *Fiziologiia Cheloveka*, vol. 7, July-Aug. 1981, p. 687-692. 26 refs. In Russian.

Normal human kidney functioning in response to aqueous potassium loading is investigated with particular attention given to the specificity of the potassiouretic response. Blood and urine samples were taken from 28 healthy subjects before and after loading with 50 mg KCl/kg body weight in a 20% aqueous solution, or water alone. The ingestion of KCl, while not inducing any variation in circulatory cation concentrations, is found to cause a two-phase diuretic reaction, a marked increase in potassium excretion, and a shorter-duration and lower elevation in natriuresis as compared with the controls. The magnitude of the potassiouretic reaction is observed to depend on the initial level of ion excretion. Results suggest the presence of a reflex mechanism of potassium balance, and demonstrate specificity in kidney ionouretic responses. A.L.W.

**A82-20330** † **Investigation of recurrent inhibition in the human spinal cord during static skeletal muscle activity (Issledovanie vozvratnogo tormozheniia v spinnom mozge cheloveka pri staticheskoi deiatel'nosti skeletnykh myshts).** I. N. Pleshchinskii and V. I. Alatyrev (Kazanskii Gosudarstvennyi Universitet, Kazan, USSR). *Fiziologiia Cheloveka*, vol. 7, July-Aug. 1981, p. 737-742. 17 refs. In Russian.

The characteristics of recurrent inhibition in the human spinal cord during and after static activity of the skeletal muscles are investigated. Determinations were made of the relation of the amplitudes of the H responses of the soleus muscle obtained during paired and single stimulation of the tibial nerve by stimuli of various intensities in subjects exerting force on a foot pedal. Static muscle activity is found to be accompanied by a reduction in the recurrent inhibition of the motoneurons innervating the muscle. Cessation of the muscle work leads to an initial decline in motoneuron reflex excitability and enhancement in recurrent inhibition, which is followed by an elevation in excitability as the inhibition continues to increase. Muscle rest during analogous activity of opposing muscles induces less marked changes in motoneuron excitability, and no response in the level of recurrent inhibition. In addition, voluntary muscular activity in one extremity is found not to influence neural activity in the spinal center of the other extremity. A.L.W.

**A82-20331** † **Pulse rate evaluation of the relative physiological intensity of aerobic muscular work (Pul'sovaia otsenka otnositel'noi fiziologicheskoi napriazhennosti aerobnoi myshechnoi raboty).** V. M. Alekseev and Ia. M. Kots (Gosudarstvennyi Tsentral'nyi Institut Fizkul'tury, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 7, July-Aug. 1981, p. 728-736. 20 refs. In Russian.

Relations between absolute and relative indicators of heart rate and oxygen uptake as measures of physiological work intensity are investigated in athletes and nonathletes during aerobic muscular activity. Bicycle ergometer exercise at the same absolute aerobic power (equal oxygen uptake) is found to be accompanied by different absolute exercise heart rates in subjects with different characteristic maximal oxygen uptakes and maximal heart rates. In work at the same relative aerobic power (percentage of maximal oxygen uptake equal), the differences in exercise heart rates between groups are reduced, and are a function primarily of maximal heart rate and heart rate reserve (the difference between actual and maximal rates). Relative pulse rate indicators (percentage maximal rate and exercise increase) remained approximately the same at equal relative aerobic powers in subjects of different capacities. It is concluded that the percent maximal heart rate and the relative increase in heart rate are the most suitable indicators of the comparative physiological intensities of aerobic work. A.L.W.

**A82-20332** † **Parameters of the interaction of bradykinin with cardiovascular system receptors (Parametry vzaimodeistviia bradikinina s retseptorami serdechno-sosudistoi sistemy).** V. I. Kiselev and A. L. Panchenko (Altaiskii Meditsinskii Institut, Barnaul, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1342-1347. 12 refs. In Russian.

A quantitative investigation is presented of cardiovascular receptor stimulation by bradykinin to produce a lowering of arterial pressure. Dose-response curves were constructed to express the relation between intravenous and intraarterial injections of bradykinin and arterial pressure in dogs and albino rats. The resulting equation is found to resemble that obtained describing depressor adrenergic and certain cholinergic reactions. The greatest hypotensive response to bradykinin injection is obtained when the peptide is administered intraaortically, and the kininergic reaction is noted to be significantly more pronounced in dogs than in rats. A.L.W.

**A82-20333** † **Changes of the aggregation and orientation structure of blood in pulsating flow (Ob izmenenii agregatsionnoi i orientatsionnoi struktury krovi pri pul'siruiushchem techenii).** V. A. Levtov, N. I. Nikiforov, and N. Kh. Shadrina (Akademiia Nauk SSSR, Laboratoriia Fiziologii Krovoobrashcheniia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1336-1341. 8 refs. In Russian.

Reflection photometry was used to investigate erythrocyte suspensions in a rigid glass tube in an effort to examine structural changes of blood as a function of hydrodynamic pulsation frequency. It is shown that the aggregation-orientation structure of the erythrocytes distinctly changes as a function of the hydrodynamic oscillation frequency of blood flow within the range of natural heart rate. B.J.

**A82-20334** † **Bioenergetic characteristics of various kinds of physical loads (Bioenergeticheskaia kharakteristika fizicheskikh nagruzok razlichnogo kharaktera).** S. V. Usik and R. I. Lenkova (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1370-1374. 12 refs. In Russian.

Bioenergetic characteristics of physical loads of various intensities and durations were obtained from experiments on adult white rats. These characteristics were used to classify the loads with respect to the character of the energy maintaining muscle activity and the use of hydrocarbon and nonhydrocarbon sources of energy. This approach can be used to evaluate the character and degree of adaptation of animals subjected to various types of loads. B.J.

**A82-20335** † **Functional condition of the rat sympatho-adrenal system during emotional and nociceptive stress (Funktsional'noe sostoianie simpato-adrenalovoi sistemy krys pri emotsional'no-bolevom stresse).** B. N. Manukhin, V. I. Pavlova, T. G. Putintseva, E. V. Volina, L. V. Berdysheva, G. D. Kurbanova, G. P. Selivanova, and F. Z. Meerson (Akademiia Nauk SSSR, Laboratoriia Fiziologii; Akademiia Meditsinskikh Nauk SSSR, Moscow; Cheliabinskii Gosudarstvennyi Pedagogicheskii Institut, Chelyabinsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1182-1188. 16 refs. In Russian.

**A82-20336** † **Respiration of brain synaptosomes under conditions of depolarization in rats deprived of paradoxal sleep (Dykhanie sinaptosom golovnogo mozga krys, lishennykh paradoksal'noi fazy sna, v usloviiakh depoliarizatsii).** N. S. Nilova (Akademiia Nauk SSSR, Laboratoriia Funktsional'noi Neirokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1324-1328. 20 refs. In Russian.

**A82-20337** † **The myenteric plexus - Basic principles of modeling neuronal organization (Mienteral'noe spletenie - Bazisnye printsipy modelirovaniia neironnoi organizatsii).** A. V. Gnetov, A. D. Nozdrachev, and S. V. Reiman (Akademiia Nauk SSSR, Laboratoriia Fiziologii Vegetativnoi Nervnoi Sistemy, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1268-1272. 11 refs. In Russian.

**A82-20529** **Flight simulation - The military need.** P. D. M. Moore (RAF, London, England). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 4 p.

Military applications of simulators for helicopter and jet pilot training are reviewed. Experience in simulators which mock the VC 10, Hercules, and Nimrod helicopters is intended to eliminate much airborne training, noting that simulation of all known threat radars is now possible. Although the RAF currently uses 23 simulators for jet flight, emphasis is placed on the fact that the simulators allow practice at emergency conditions, procedures, and instrumentation, while only with new Tornado simulators will there be full handling capability simulation. The use of g seats, the length of an acceleration impulse, and the possibilities for full-image motion generation by computer are discussed. The instructor's instrument panel is criticized, and suggestions are made for improving switch spacing, more accurate feedback instrumentation from the trainee's panel, and a more advantageous viewing position. M.S.K.

**A82-20534** **Flight simulation in the current Australian airline scene.** A. R. Gray (Transport Australia, Australia). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 7 p.

The use of simulators by the two nationally and one internationally franchised Australian airlines is described. The simulators for 747 aircraft flying are considered to be sufficient for credit for all air-work sequences, for engine failure in take-off, and for all instrument flight sequences and two- and three-engine approaches, but not for landing and flare. Accreditation levels for the internal operators are reviewed, noting that thus far no pilot has received landing credits in a simulator, and the near term arrival of six degrees-of-freedom simulators with wraparound visuals is mentioned. Personnel isolation and formal radio conversations are used to maintain the fidelity of the simulations, and pilots are frequently employed to judge the effectiveness of the simulators in giving the actual feel of a real aircraft. M.S.K.

**A82-20538** **Visual technology and the future.** D. Shorrock (Rediffon Simulation, Inc., Arlington, TX). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 4 p.

The development of visual reproductions with high realism fidelity for flight simulators is traced, and attention is given to regulatory requirements. Computer generated imagery reached the stage of two-window, full color landing maneuvers in about 1980, and the 747 simulator features four-window, three channel projection, in line with FAA Phase II requirements. Flight through low cloud layers and the matching of a variable coefficient of friction to visual representation of a contaminated runway are reviewed, and a distinction is made between the necessities of normal flight training simulators and the task-oriented complexities of military simulators. The installation of redundant architecture and parallel processing units in a modular approach to simulator computer design is asserted to be the means for highly complex, realistic, Phase III simulators. M.S.K.

**A82-20539** **The semi-automatic instructional system.** W. S. Reese and R. A. Hansen (Singer Co., Link Div., Binghamton, NY).

In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 17 p.

The requirements and operational characteristics of the B-52 Weapon System Trainer are discussed. The WST has functional simulation for six crew members in two groups of three, with six degrees-of-freedom and the option of separate operation by any two-man team in their own segment. Noting that many of the WST functions cannot be performed for practice on board the aircraft, the system has been designed to easily accommodate changes in the weapons and avionics of the actual B-52. Provisions have been made for instructor data gathering and scoring of trainee performance, and the requirements for software development are outlined. The instructor is provided with a three module console with access to the views being displayed in the WST, and is given broad selection in choosing the flight environment to which the trainees are subjected. M.S.K.

**A82-20772** # **Working in space.** G. V. Butler (McDonnell Douglas Astronautics Co., Huntington Beach, CA). Research sponsored by the American Institute of Aeronautics and Astronautics. New York, American Institute of Aeronautics and Astronautics (AIAA Aerospace Assessment Series. Volume 5), 1981. 134 p. 17 refs. Members, $20; nonmembers, $24.

The developing capability of human beings to work in space are examined, with consideration given to the lessons learned from previous U.S. and Soviet space missions. Noting the innovative measures taken by the crewmembers of the Apollo 13 flight to avert disaster, the equipment and procedures for spending extended periods of time in space which were developed and tested during the Skylab and Salyut missions are reviewed. Repairs were effected on the Skylab solar panels and psychological and physical requirements were defined, as were spacecraft re-entry profiles when the Skylab finally came down. The functions and the experimental packages designed for the Space Shuttle are described, with particular attention given to the equipment intended to provide a greater range of activity and usefulness for space activities. Finally, projections are made for future, expanded space missions, including the construction of large space structures, the use of manned orbit transfer vehicles, and the colonization of space and the moon. M.S.K.

**A82-20778** # **Flow visualization techniques in medical and biological applications.** W.-J. Yang (Michigan, University, Ann Arbor, MI). In: International Symposium on Flow Visualization, Bochum, West Germany, September 9-12, 1980, Preprints of Contributed Papers. Bochum, West Germany, Ruhr-Universität Bochum, 1981, p. 13-26. 60 refs.

The application of flow visualization techniques to medicine, pharmacology, and biology are reviewed. Contrast media, in liquid or gas state, or as fine particles suspended in solution, are used to intensify the image in contrast to its surrounding tissues through dyes, fluorescein, radioactive contrast media, and radioisotope-labeling. Dyes and optical methods are used most often, whereas photography and radiology are commonly used in either a single or sequential recordings. The morphology and functions of many biological systems may be observed by the unaided eye or with the aid of an optical instrument. A magnified image may also be produced by either (1) photographic or optical magnification; (2) direct geometric magnification; or (3) electronic magnification. J.F.

**A82-20853** * **Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, University of Maryland, College Park, MD, October 29-31, 1980.** Colloquium supported by NASA. Edited by C. Ponnamperuma (Maryland, University, College Park, MD). Dordrecht, D. Reidel Publishing Co., 1981. 287 p. $39.50.

Papers are presented concerning the characteristics of comets and their possible role in the origin of life. Specific topics include the characteristics, origin and structure of the cometary nucleus, cometary chemical abundances, the nature of interplanetary dust and its entry into terrestrial planet atmospheres, and the mechanism of ray closure in comet tails. Attention is also given to chemically evolved interstellar dust as a source of prebiotic material, the relation of comets to paleoatmospheric photochemistry, comets as a vehicle for panspermia, limits to life posed by extreme environments, and the status of cometary space missions as of 1980. A.L.W.

**A82-20863** **Chemical evolution of interstellar dust - A source of prebiotic material.** J. M. Greenberg (Leiden, Rijksuniversiteit, Leiden, Netherlands). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 111-127. 12 refs. Research supported by the Stichting voor Fundamenteel Onderzoek der Materie and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

The chemical evolution of interstellar matter is examined in relation to the possibility of an extraterrestrial origin for prebiotic molecules. Theoretical and laboratory studies of the chemical evolution of interstellar dust grains are summarized which indicate a chemical composition at the time of the early pre-solar nebula of complex nonvolatile molecular mixtures of oxygen, carbon and nitrogen with hydrogen in addition to volatiles, which may be the predominant constituents of an accreting comet. The photoprocessing of interstellar material is found capable of converting on the order of 10% of all available carbon, oxygen and nitrogen into large molecules after 10 million years. Consideration of the possible mechanisms for the transport of interstellar organic molecules to the primitive earth indicates that direct accretion during the passage of the solar system through a dense interstellar cloud is a more likely source of prebiotic molecules than accretion from cometary material. A.L.W.

**A82-20864** **Comets and the origin of life - The stable isotope approach.** P. I. Abell (Cambridge University, Cambridge, England; Rhode Island, University, Kingston, RI), A. E. Fallick, N. J. McNaughton, and C. T. Pillinger (Cambridge University, Cambridge, England). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 129-139. 31 refs. Research supported by the Science Research Council, Natural Environment Research Council of England, and Nuffield Foundation.

An improved knowledge of the carbon isotopic composition of comets would be important in the establishment of links between comets and the origin of life on earth. The paper presents suggestions concerning a possible method for measuring stable isotope ratios in presumed terrestrial cometary debris or in situ. The method under development for carbon isotope measurements on Brownlee particles collected in the stratosphere involves static mass spectrometry with all carbon samples converted to CD4 by a gas phase process using D2 and a nickel catalyst. A cometary isotope front end reactor is also under development which would perform the same function on a space probe on a cometary fly-by mission. A.L.W.

**A82-20865** * **Are comets connected to the origin of life.** A. H. Delsemme (Toledo, University, Toledo, OH). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 141-159. 27 refs. NSF Grant No. AST-80-18919; Grant No. NsG-7381.

Possible connections between comets and the origin of life on earth are discussed. The orbital evolution of comets and their origin are considered within a framework for the origin of the solar system, with particular attention given to the origin of the biosphere, and the origin of the Oort cloud. Evidence suggesting that cometary nuclei are undifferentiated throughout is considered, and a model of the average composition of a mean new comet is obtained from observational data which is similar to that of an interstellar frost. The chemistry of the model composition giving rise to the species observed in cometary spectra is considered, as well as the relations of cometary to cosmic abundances of oxygen, carbon and sulfur. The characteristics of possible sites for prebiotic chemistry, including interstellar clouds, the protosolar nebula, comets in the Oort cloud, periodic comets and the primitive earth, are examined, and a possible role of comets in bringing the interstellar prebiotic chemistry to earth is suggested. A.L.W.

**A82-20866 #** **Comets and the photochemistry of the paleoatmosphere.** J. S. Levine, R. E. Boughner (NASA, Langley Research Center, Hampton, VA), T. R. Augustsson (Old Dominion University, Norfolk, VA), M. Natarajan (Joint Institute for Advancement of Flight Sciences, Hampton, VA), and L. J. Sacks (Christopher Newport College, Newport News, VA). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 161-190. 66 refs.

Ozone (O3) is a key atmospheric gas in considerations of the photochemistry/chemistry of the paleoatmosphere, chemical evolution, and the origin and evolution of life. The photochemistry/chemistry of atmospheric O3 in the paleoatmosphere is investigated using a one-dimensional photochemical model that includes the chemistry of oxygen, nitrogen, hydrogen, carbon, and chlorine gases. The role of cometary influx of H2O on the photochemistry of the paleoatmosphere is also examined. Recently, it has been suggested that the planet received a significant portion of the volatiles presently in the atmospheric/oceanic/biospheric system from cometary volatile influx. Several consequences of a cometary H2O influx on the photochemistry and structure of the paleoatmosphere are presented. (Author)

**A82-20867 #** **Cometary material and the origins of life on earth.** A. Lazcano-Araujo (Universidad Nacional Autónoma de México, Villa Obregón, Mexico) and J. Oro (Houston, University, Houston, TX). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 191-225. 180 refs. Research supported by the Consejo Nacional de Ciencia y Tecnologia; Grant No. NGR-44-005-002.

The role of cometary material in determining the environmental conditions of the prebiotic earth is reviewed. The organic synthesis pathways that occur in dense interstellar clouds and in comets are examined, and complex organic molecules believed to exist (amino acids, carboxylic acids, purines, pyrimidines and hydrocarbons) based on spectral detections of degradation products are noted. Estimates of the amount of terrestrial volatiles of cometary origin that may have been acquired in collisions during the early history of the earth are considered, and shown to dominate any estimated contributions to terrestrial carbon from other extraterrestrial sources. Current evidence that the origin and early evolution of life began about four billion years ago is discussed in relation to the cometary bombardment processes occurring at the time and the resultant shock waves, reducing atmospheres and reactive chemical species. It is thus concluded that comets contributed significantly to the processes of chemical evolution necessary for the emergence of life on earth. A.L.W.

**A82-20868** **Comets - A vehicle for panspermia.** F. Hoyle and C. Wickramasinghe (University College, Cardiff, Wales). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 227-239. 12 refs.

Arguments are presented for the panspermia hypothesis, according to which life is a phenomenon inherent in the cosmos, and for the role of comets in the transport, amplification and dispersal of life throughout the universe. Panspermia is shown to be a consequence of the observation that life is always derived from life, which observation is supported by the fossil record up to 3.83 billion years ago, when the Isua sediments were deposited. Problems with the probability of specifying the information necessary for living processes from an initially chaotic assemblage of biological monomers are discussed as evidence that life could not have arisen independently on earth, and astronomical evidence for the possibility of the interstellar dispersal of spores is noted. It is argued, however, that a more efficient process for the amplification and dispersal of life on a cosmic scale would be development and transport within comets. It is also shown that the properties of interstellar extinction may be explained by the bacterial nature of the interstellar grains. A.L.W.

**A82-20869** **Extreme environments - Are there any limits to life.** D. Kushner (Ottawa, University, Ottawa, Canada). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 241-248. 24 refs.

Limits to the environments in which microorganisms can survive and grow are considered in relation to the possibility of the existence and evolution of life on comets. Microbial growth in boiling and freezing water, conditions of high salinity, extreme acidity and alkalinity up to pH 11.5 and high radiation is discussed, and it is noted that the mechanisms of life under these extreme conditions appear similar to those under more normal conditions. It is observed that all growth requires relatively abundant amounts of liquid water, as growth does not take place within ice or water activities below 0.6 although organisms may survive much drier or colder conditions. It is concluded that unless comets have substantial zones of liquid water, terrestrial-type life cannot exist or arise there. A.L.W.

**A82-20871 #** **Comets and the origin of life - Bibliography.** L. G. Pleasant (George Washington University, Medical Center, Washington, DC). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 255-288. 188 refs. Contract No. NASw-3165.

**A82-20881** **Measurement of radio frequency permittivity of biological tissues with an open-ended coaxial line. I.** T. W. Athey (U. S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), M. A. Stuchly (Department of National Health and Welfare, Radiation Protection Bureau; Ottawa, University, Ottawa, Canada), and S. S. Stuchly (Ottawa, University, Ottawa, Canada). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-30, Jan. 1982, p. 82-86. 11 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada and Ontario Ministry of Labor.

**A82-20882** **Measurement of radio frequency permittivity of biological tissues with an open-ended coaxial line. II - Experimental results.** M. A. Stuchly (Department of National Health and Welfare, Radiation Protection Bureau; Ottawa, University, Ottawa, Canada), T. W. Athey (U.S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), G. M. Samaras, and G. E. Taylor (Maryland, University, Baltimore, MD). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-30, Jan. 1982, p. 87-92. 9 refs.

**A82-20883** **Waveguide technique for the calibration of miniature implantable electric-field probes for use in microwave-bioeffects studies.** D. A. Hill (Defence Research Establishment, Protective Sciences Div., Ottawa, Canada). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-30, Jan. 1982, p. 92-99. 17 refs.

**A82-20901** **Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.** Meetings sponsored by the International Society for the Study of the Origin of Life, Israel Academy of Sciences and Humanities, Weizmann Institute of Science, and Hebrew University of Jerusalem. Edited by Y. Wolman (Jerusalem, Hebrew University, Jerusalem, Israel). Dordrecht, D. Reidel Publishing Co., 1981. 626 p. $73.50.

Papers are presented on various aspects of the origin of life as they relate to interstellar molecules, meteorites, the abiotic synthesis of small molecules, prebiotic polymerization, the origin of optical activity and the genetic code, early biochemical evolution, and fossils. Specific topics include the origin of organic molecules in interstellar space, the role of comets in the origin of life, the nitrogenous compounds in carbonaceous meteorites, the role of UV light and electric discharges in the chemical evolution of a reducing atmosphere, the role of clays as prebiotic photocatalysts and the formation of amino acids from sugars and ammonia in an ocean medium. Attention is also given to metal ion catalysis of the template-directed synthesis of oligoguanylic acids, the cold theory of the origins of life, the amplification of optical activity by crystallization processes, evolutionary processes of the genetic code, a search for primitive replication, the phylogentic sequence of metabolic pathways in the Precambrian, and the evolution of Rhodospirillaceae and mitochondria. A.L.W.

**A82-20903** **Interstellar molecules and the origin of life.** R. D. Brown (Monash University, Clayton, Victoria, Australia). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 1-8. 11 refs.

The hypothesis that life on earth arose not as a consequence of in situ chemical evolution but instead arrived at earth from interstellar space is considered. Problems with the orthodox view related to the probable nature of the original earth atmosphere and the accumulation of prebiotic molecules in the presence of solar UV radiation are first noted. The complex organic molecules detected in dark nebulae, from which stars and planetary systems are believed to be formed, are listed, and studies of the spectroscopic properties of gaseous forms of urea and glycine are noted. The collapse and heating of a dark cloud are considered, and evidence from carbonaceous chondrites that some cloud material is never heated above 100 C during star formation is noted. Hypotheses for the transport of complex organic material to earth in meteorites and the transport of life evolved in cometary nuclei to earth in micrometeorites are also considered. A.L.W.

**A82-20904** **On the origin of organic molecules in interstellar space and some of its consequences.** K. L. V. Johansson (Astronomiska Observatoriet, Uppsala, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 19-26.

Possible sources for the complex organic molecules observed in interstellar space are examined, and consequences of the likley sources for the origin of life on earth are discussed. Calculations are presented which show that the amount of molecules that may have escaped from lifebearing planets such as earth is insufficient to account for the observed quantities of organic molecules in interstellar space. Rather, the molecules must have formed in interstellar clouds, either free in space or on the surfaces of grains. Such interstellar clouds may have been a source of organic compounds in the formation of the solar system, or may have deposited a substantial amount of organic molecules on earth as the solar system passed through a cloud. The subsequent chemical evolution of this material into biological molecules may be investigated by Urey-Miller type experiments with more complex starting mixtures than usual. A.L.W.

**A82-20905 *** **Comets and the origin of life.** W. M. Irvine (Onsala Space Observatory, Onsala, Sweden), S. B. Leschine, and F. P. Schloerb (Massachusetts, University, Amherst, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 27-32. 38 refs. Grant No. NGL-22-010-023.

The possible role of comets as sites for chemical and/or biological evolution is considered from both the positive and the negative viewpoints. On the negative side, it is pointed out that direct evidence for the chemical composition and size of cometary nuclei is lacking and the thermal history of comets is unknown, so that the length of time that liquid water could have been available ranges from zero to over a billion years. On the positive side, there remains the possibility that there may have been comets which retained liquid water in their interior for a sufficient time and that have more complex molecules than the amino acids and nucleic acid bases found in carbonaceous chondrities, and that the cometary environment may have been more favorable to the origin of life than the terrestrial. It has also been demonstrated that cometary material falls to earth at a significant rate. Problems in understanding the course of chemical evolution on earth may thus have a solution in cometary processes. A.L.W.

**A82-20906 *** **Nature and origin of organic molecules in comets.** A. H. Delsemme. In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 33-42. 29 refs. NSF Grant No. AST-79-14789; Grant No. NsG-7301.

The organic molecules sublimating from the cometary nucleus either represent the 'frost' of interstellar molecules that condensed onto those interstellar grains that have later accreted into comets, or they represent the 'snows' that condensed onto silicate grains during the cooling phase of the presolar nebula. Even if one does not accept the speculations of Hoyle and Wickramashinghe (1977), the fact that prebiotic chemistry could have been brought from the interstellar space or from the solar nebula to the Earth by comets is an intriguing possibility that cannot be ruled out at this stage. (Author)

**A82-20907** **Liquid water on a planet over cosmic periods.** M. D. Papagiannis (Boston University, Boston, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 43-50. 13 refs.

From the equation that determines the average temperature of a planet, it is seen that even small changes in the distance, albedo and greenhouse effect of the planet, if not properly compensated, can eliminate liquid water from the surface of the planet through either runaway glaciation or a runaway greenhouse effect. Since active life requires the presence of liquid water, and since its evolution to higher intelligence seems to require billions of years, it follows that the ability of planets to maintain liquid water over cosmic periods is probably the critical factor that determines the abundance of advanced civilizations in the cosmos. (Author)

**A82-20908 *** **Organic analysis of the Antarctic carbonaceous chondrites.** R. K. Kotra, A. Shimoyama, C. Ponnamperuma (Maryland, University, College Park, MD), P. E. Hare (Carnegie Institution of Washington, Washington, DC), and K. Yanai (National Institute of Polar Research, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 51-57. 14 refs. NSF Grants No. DPP-77-08993; No. DPP-79-00991; Grant No. NGR-21-002-317.

Thus far, organic analysis of carbonaceous chondrites has proven the only fruitful means of examining complex organic matter of extraterrestrial origin. The present paper presents the results of organic analysis of two Antarctic meteorites, Allan Hills (77306) and Yamato (74662), which may be considered free from terrestrial contamination. Ion-exchange chromatography, gas chromatography and mass spectrometery of meteorite samples reveal the presence in Yamato of 15 and in Allan Hills of 20 protein and nonprotein amino acids, the most abundant of which are glycine and alanine. Abundances of the D and L enantiomers of each amino acid are also found to be nearly equal. Data thus indicate an abiotic extraterrestrial origin for the matter, and confirm a lack of terrestrial contamination. A.L.W.

**A82-20909** **Nitrogen compounds in carbonaceous meteorites - A reassessment.** P. G. Stoks and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 59-64. 28 refs.

A reinvestigation of the presence of N-heterocyclic compounds in the Murray, Murchison and Orgueil carbonaceous meteorites has been undertaken. The positive identification of the pyrimidine uracil and the purines adenine, guanine, xanthine and hypoxanthine is reported. The s-triazines melamine, ammeline, ammelide and cyanuric acid could not be detected in any meteorite, above a detection limit of 50 ppb. These results, together with laboratory data on the formation of s-triazines, are discussed in relation to proposed mechanisms of formation of organic compounds in carbonaceous meteorites. (Author)

**A82-20910** **Abiotic organic synthesis in space.** M. R. Bloch (Max-Planck-Institut für Kernphysik, Heidelberg, West Germany) and H. L. Wirth (Negev, University, Beersheba, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 65-71. 14 refs.

An experimental model for the formation of iron meteorites in space is presented which may also account for the presence of organic substances in comets and meteorites. The model consists of passing iron carbonyl and nickel carbonyl gas mixtures with H2S at 180 C between the poles of a permanent magnet. Strings of iron-nickel globules are formed which are similar in structure and chemical composition to the kamacite, taenite, troilite and pentlandite phases of meteorites. The carbonyl groups may then react in a Fischer-Tropsch-type reaction to form graphite and hydrocarbons, as observed in commercial processes. It is suggested that temperature gradients produced as comets near the sun may lead to the collection of metal carbonyls in the cometary interior, and that the resultant synthesis in a magnetic field may account for the optical activity of organic compounds. A.L.W.

**A82-20911** **Formation of prebiotic precursors from model reducing atmospheres - Role of hydrogen escape.** D. Mourey, F. Raulin, and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 73-82. 12 refs. Research supported by the Centre National d'Etudes Spatiales; Centre National de la Recherche Scientifique Grant No. 3721.

The influence of the atmospheric escape of hydrogen on the chemical evolution of a reducing atmosphere and on the synthesis of organic compounds within it is investigated. Experiments were performed in the absence of liquid water in a discharge chamber containing 50 torr CH3 and 100 torr gaseous H2O with palladium membranes to permit the escape of the H2 formed. In experiments performed without H2 escape, H2 rapidly becomes the most abundant product, and a steady-state CO/CO2 concentration ratio of about 7 is reached by the end of the experiment. In contrast, hydrogen escape during the course of the reaction causes a more rapid decline in CH4 concentration, decreases in CO and H2O concentration, and a steady state characterized by greater levels of CO2 than CO. The hydrocarbons formed are also observed to be more rapidly destroyed in the oxidizing atmosphere resulting from hydrogen escape, although hydrogen escape has no effect on the synthesis of oxygen-containing organics. A.L.W.

**A82-20912** **Organic chemical evolution of reducing model of the atmosphere of the primitive earth - Role of UV light and electric discharges.** A. Bossard, F. Raulin, D. Mourey, and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 83-92. 24 refs. Research supported by the Centre National d'Etudes Spatiales.

**A82-20913** **Far UV photolysis of methane-water gaseous mixtures and the prebiotic synthecis of aldehydes.** A. Bossard and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 93-100. 18 refs. Research supported by the Centre National d'Etudes Spatiales.

**A82-20914 *** **Photolysis of CH4-NH3 mixtures and PH3 as models for the photochemical transformations on the primitive earth and Jupiter.** J. P. Ferris, J. Y. Morimoto, and R. Benson (Rensselaer Polytechnic Institute, Troy, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 101-106. 13 refs. Grant No. NGR-33-018-148.

Methane, ammonia and phosphine are some of the possible constituents of the atmospheres of the Jovian planets and their satellites. Photolysis of NH3 in the presence of CH4 at 185 nm in the temperature range of 26 C to -100 C results in the decomposition of CH4. The reaction is inhibited by added H2 or SF6. These findings are consistent with the reaction of hot hydrogen atoms with CH4 to give the CH3 radical. P2H4 is the initial product formed by the photolysis of PH3 at 206 nm. Kinetic studies established that it is the intermediate in the formation of P4 from PH3. The potential significance of these reactions to the atmospheric photochemistry of the Jovian planets and moons is discussed. (Author)

**A82-20915 *** **Possible role of phosphine in chemical evolution.** F. Raulin (Paris XII, Université, Créteil, Val-de-Marne, France) and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 107-114. 18 refs. Research supported by the Centre National de la Recherche Scientifique and NSF; Grant No. NGR-21-002-317.

Experiments simulating the formation of organic molecules in model reducing atmospheres including phosphine show that a variety of organic molecules can be synthesized. From the experiments using UV light as an energy source, it appears that the presence of phosphine drastically increases the yield of photolysis of methane and, thus, the yield of the formation of organic matter. The presence of phosphine enhances the formation of organophosphorous compounds, such as methyl and dimethylphosphine. (Author)

**A82-20916 *** **Clays as prebiotic photocatalysts.** L. M. Coyne, J. Lawless (NASA, Ames Research Center, Moffett Field, CA), N. Lahav (Jerusalem, Hebrew University, Rehovot, Israel), S. Sutton (Washington University, St. Louis, MO), and M. Sweeney (Santa Clara, University, Santa Clara, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 115-124. 24 refs.

Clay minerals catalyze peptide bond formation in fluctuating environments. A number of plausible mechanisms have been proposed and tested. The possibility that clays may actually be energizing the reaction by means of electronic excitation, creating mobile or trapped holes and electrons in the lattice, is explored. It has been discovered that clays emit light upon dehydration. The correlation between dehydration-induced, or thermoluminescent, processes and the yield of glycine oligomers after treatments known to affect the luminescent yields is being tested, in an effort to understand the catalytic mechanism. (Author)

**A82-20917 *** **Clay-mediated reactions of HCN oligomers - The effect of the oxidation state of the clay.** J. P. Ferris, K. W. Alwis, E. H. Edelson, N. Mount, and W. J. Hagan, Jr. (Rensselaer Polytechnic Institute, Troy, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 125-128. 12 refs. NSF Grant No. CHE-76-11000; Grant No. NGR-33-018-148.

Montmorillonite clays which contain Fe(III) inhibit the oligomerization of aqueous solutions of HCN. The inhibitory effect is due to the rapid oxidation of diaminomaleonitrile, a key intermediate in HCN oligomerization, by the Fe(III) incorporated into the aluminosilicate lattice of the clay. The Fe(III) oxidizes diaminomaleonitrile to diiminosuccinonitrile, a compound which is rapidly hydrolyzed to HCN and oxalic acid derivatives. Diaminomaleonitrile is not oxidized when Fe(III) in the montmorillonite is reduced with hydrazine. The oxidation state of the clay is an important variable in experiments designed to simulate clay catalysis on the primitive earth. (Author)

**A82-20918** **Chemical evolution and plate tectonics.** D. E. Ingmanson (California, University, La Jolla, CA) and M. J. Dowler (San Diego State University, San Diego, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 129-134. 25 refs.

Laboratory analysis of Red Sea Atlantis II Deep brine solutions revealed a significant thiocyanate concentration (0.000024 M). Amino acid analysis revealed large quantities of glycine (about 1 micromole per liter), and no other dissolved free amino acids. This brine and the underlying sediment constitute a reducing, acidic, clay-rich, anhydrous-to-hydrous gradient system that can vary in temperature from 1100 C underlying magma to 63 C water. Since these conditions occur along a sea floor spreading zone, there may be an important link between the origin and evolution of the earth's crust and chemical evolution. (Author)

**A82-20919** **The Strecker synthesis in the primitive ocean.** S. L. Miller and J. E. Van Trump (California, University, La Jolla, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and

Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 135-141. 6 refs.

Most prebiotic amino acid syntheses proceed through the amino nitrile (Strecker synthesis). The equilibrium constants for the formation of glycine nitrile and alanine nitrile have measured as well as the kinetics of their hydrolysis to the amides and amino acids. From the data the yields of amino and hydroxy acids can be calculated as a function of pH, temperature and ammonia concentration. It can also be shown that amino acids can be synthesized at high dilutions in the primitive ocean. (Author)

**A82-20920 *** **Photoassisted carbon dioxide reduction and formation of two- and three-carbon compounds.** M. Halmann, B. Aurian-Blajeni (Weizmann Institute of Science, Rehovot, Israel), and S. Bloch (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 143-150. 25 refs. Research supported by the U.S.-Israel Binational Science Foundation and NASA.

The photoassisted reduction of aqueous carbon dioxide in the presence of naturally occurring minerals is investigated as a possible abiotic precursor of photosynthesis. Aqueous carbon dioxide saturated suspensions or surfaces of the minerals nontronite, bentonite, anatase, wolframite, molybdenite, minium, cinnabar and hematite were irradiated with high-pressure mercury lamps or sunlight. Chemical analyses reveal the production of formic acid, formaldehyde, methanol and methane, and the two and three-carbon compounds glyoxal (CHOCHO) and malonaldehyde (CH2(CHO)2). It is suggested that such photosynthetic reactions with visible light in the presence of semiconducting minerals may provide models for prebiological carbon and nitrogen fixation in both oxidized and reduced atmospheres. A.L.W.

**A82-20921** **Melanoidin polymers as possible oxygen sinks in the pre-biotic oceans.** A. Serban and A. Nissenbaum (Weizmann Institute of Science, Rehovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 151-156. 8 refs.

An environment in which oxygen is lacking, or at least depleted, is generally believed to be a prerequisite for abiotic organic synthesis. The present paper proposes melanoidin scavenging as an alternative to ferrous ion reactions as a sink for oxygen in the prebiotic atmosphere. Results are presented of experiments in which melanoidins, formed by the Maillard reaction between carbohydrates and amino acids, are allowed to react with molecular oxygen. In all glucose-amino acid mixtures investigated, oxygen concentration in the gas phase above the reacting mixture is found to decrease as the reaction proceeds, with the oxygen consumption rate dependent on the nature of the amino acid as well as the temperature. Variations in the oxygen consumption rate also indicate the presence of several intermediates in melanoidin-polymer synthesis. It is concluded that the prebiotic formation of amine and carbohydrate monomers should lead to the generation of melanoidin-like polymers which, as they condense, would remove oxygen into ocean sediments. A.L.W.

**A82-20922** **Formation of energy rich phosphate in Fenton's reaction.** O. Saygin and P. Decker (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 157-164. 28 refs.

The oxidation of various substrates by a modified Fenton's reagent is examined as a possible source of radical intermediates capable of incorporating phosphate or acylate ions into energy-rich compounds, under prebiotic conditions. Experiments were performed in systems of Na2HPO4.2H2O, FeSO4.7H2O, ascorbic acid, amd EDTA at 0 C with H2O2 or O2 added as the oxidant and substrates including imidazoles, purines, pyrimidines, cyanamide, and formamide. Yields of up to 32% inorganic phosphate transformed into organic form are obtained with 2-methylimidazole as the substrate, with positive results also found in reactions with imidazole, 1-methylimidazole, 4-hydroxymethylimidazole, histamine, and pyrimidine. The organic phosphate formed from 2-methylimidazole has been shown to be an alkali-labile phosphoric acid ester of a 4,5-dihydroxyimidazoline. Results emphasize the importance of reactions, such as those involving coupling between energy and group transfer, in the first steps of chemical organization in open systems capable of generalized Darwinian evolution. A.L.W.

**A82-20923** **Abiotic synthesis of phosphoric esters of monosaccharides according to the 'cold model'.** C. I. Simionescu, S. Dumitriu and A. Constantinescu (Iasi, Institutul Politehnic, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 165-172. 13 refs.

**A82-20924** **Synthesis and degradation of amino acids by contact glow discharge electrolysis, a possible route for prebiotic formation of bio-organic compounds.** K. Harada, J.-I. Terasawa, and H. Gunji (Tsukuba, University, Sakura, Ibaraki, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 173-180. 13 refs.

**A82-20925** **Genesis of amino acids in the primeval sea - Formation of amino acids from sugars and ammonia in a modified sea medium.** H. Yanagawa, Y. Kobayashi, and F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 181-187. 11 refs.

**A82-20926** **Porphyrin-like compounds genesis under simulated abiotic conditions.** C. I. Simionescu, B. C. Simionescu, M. Leanca, C. Ananiescu, and R. Mora (Iasi, Institutul Politehnic, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 189-196. 16 refs.

Investigations into the synthesis of porphyrins, carried out according to 'the cold theory' of the appearance and evolution of the first living forms, showed that porphyrin-like pigments are formed in abiotic simulated conditions. Parallel studies on the classical organic synthesis of porphyrins indicated that pyrrole and formaldehyde were involved in their abiogenesis. The ready formation of these compounds - and especially that of their metallic chelates - in abiotic conditions is significant, suggesting the possibility of their appearance and intervention during the early stage of chemical evolution. (Author)

**A82-20927** **The role of analytical procedures in the formation of biochemicals from experiments simulating the chemical evolution of primeval earth.** F. Stoetzel, A. Shimoyama, C. Ponnamperuma, and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France; Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 197-199.

**A82-20928 *** **Reduction of thionucleosides - A prebiotic pathway to deoxyribonucleosides.** A. D. Patel, W. H. Schrier, M. A. Hrncir, and J. J. Nagyvary (Texas A & M University, College Station, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 201-207. 14 refs. NASA-supported research.

A mechanism is proposed for the prebiotic synthesis of deoxyribonucleotides and possible nucleic acid analogs from ribonucleotides by a pathway involving 2'-thio-2'-deoxyribonucleosides. The mechanism is supported by laboratory experiments in which 2'-thio-2'-deoxycytidine was synthesized from anhydro arabinosyl cytosine in dithiophosphate and CS2. The subsequent reduction of the thio-analogs has been achieved with ferrous ion, and photochemically. It is noted that the proposed pathway for prebiotic deoxyribonucleotide synthesis is in harmony with the Principle of

Continuity, as both the proposed and present pathways rely on the reduction of a 2' functional group. A.L.W.

**A82-20929 *** **Factors influencing the rate of non-enzymatic activation of carboxylic and amino acids by ATP.** D. W. Mullins, Jr. and J. C. Lacey, Jr. (Alabama, University, Birmingham, AL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 209-216. 12 refs. Grant No. NGR-01-010-001.

The nonenzymatic formation of adenylate anhydrides of carboxylic and amino acids is discussed as a necessary step in the origin of the genetic code and protein biosynthesis. Results of studies are presented which have shown the rate of activation to depend on the pKa of the carboxyl group, the pH of the medium, temperature, the divalent metal ion catalyst, salt concentration, and the nature of the amino acid. In particular, it was found that of the various amino acids investigated, phenylalanine had the greatest affinity for the adenine derivatives adenosine and ATP. Results thus indicate that selective affinities between amino acids and nucleotides were important during prebiotic chemical evolution, and may have played a major role in the origin of protein synthesis and genetic coding. A.L.W.

**A82-20930** **HCN oligomerization - Isolation and preliminary characterization of a new precursor of adenine.** A. B. Voet and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 217-223. 22 refs.

**A82-20931 *** **Cyanamide mediated syntheses of leu, ala, and phe peptides under plausible primitive earth conditions.** J. R. Hawker, Jr. and J. Oro (Houston, University, Houston, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 225-232. 20 refs. Grant No. NGR-44-005-002.

**A82-20932 *** **Template-directed synthesis of oligoguanylic acids - Metal ion catalysis.** P. K. Bridson, H. Fakhrai, R. Lohrmann, L. E. Orgel, and M. van Roode (Salk Institute for Biological Studies, San Diego, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 233-239. 7 refs. Grants No. NGR-05-067-001; No. NIH-GM-13435.

The effects of Zn(2+), Pb(2+) and other metal ions on the efficiency and stereo-selectivity of the template-directed oligomerization of guanosine 5'-phosphorimidazolide are investigated. Reactions were run in the presence of a polyC template in a 2,6-lutidine buffer, and products analyzed by high-performance liquid chromatography on an RPC-5 column. The presence of the Pb(2+) ion is found to lead to the formation of 2'-5' linked oligomers up to the 40-mer, while Zn(2+) favors the formation of predominantly 3'-5' linked oligomers up to the 35-mer. When amounts of uracil, cytidine or adenosine 5'-phosphorimidazole equal to those of the guanosine derivative are included in the reaction mixture, the incorrect base is incorporated into the oligomer about 10% of the time with a Pb(2+) catalyst, but less than 0.5% of the time with Zn(2+). The Sn(2+), Sb(3+) and Bi(3+) ions are also found to promote the formation of 2'-5' oligomers, although not as effectively as Pb(2+), while no metal ions other than Zn(2+) promote the formation of the 3'-5' oligomers. The results may be important for the understanding of the evolution of nucleic acid replication in the absence of enzymes. A.L.W.

**A82-20933** **Chemical evolution of model systems of primeval earth periphery and thermal polymerisation of aqueous solutions of cyanides.** F. Stoetzel and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 241-246. 6 refs.

**A82-20934** **The polymerization products of alpha-aminopropionitrile - The component separation using cation-exchange resin.** S. Morimoto, K. Kawashiro, H. Yoshida, and K. Sugiura (Tokushima University, Tokushima, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 247-254.

The separation of the products of the polymerization of alpha-aminopropionitrile (APN) on Amberlite CG-50 cation-exchange resin is discussed. The polymerization products, which were formed from the reaction of APN with alpha, alpha-prime-iminodipropionitrile at 0 C over the course of eight years, underwent batch separation with Amberlite CG-50 equilibrated with water to yield the acidic and neutral component, equilibrated with aqueous acetic acid to yield the weakly basic component, and equilibrated with ammonia to yield the basic component. Each component was then fractionated through a Sephadex G-10 column to separate polymer and oligomer sections. Amino acid analysis was performed on the gel-filtration fractions of each component, indicating the peptide, peptide amide and peptide nitrile nature of the acidic and neutral, weakly basic, and basic components, respectively, as well as the presence of imino compounds in each component. A.L.W.

**A82-20935** **The cold theory of the origins of life - Assumptions for the theory and experimental evidence.** C. I. Simionescu and F. Denes (Institute of Macromolecular Chemistry, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 255-262. 13 refs.

Experimental results obtained in low temperature conditions and using a cold plasma as an energy source are presented as a basis for a cold theory of the origins of life. Reasoning that a recombination of active species does not occur in chemical thermodynamics, experiments were performed to find evidence that macromolecular precursors to living matter accumulated on ice-covered surfaces. Polypeptide-like and polysaccharide-like materials were formed when a feed composition of NH3 was injected into an apparatus which modeled the early earth's environment by having ice at -60 deg at the bottom of a reactor and an RF electrode to create a plasma on the top. Protobiopolymers were found to form lipid-like structures which self-assembled and exhibited membrane-like structures with electrical properties suggestive of reversible transducers of various kinds of energies. M.S.K.

**A82-20936** **The appearance of protobiopolymers and protomembranes in accordance with the 'cold theory' of the origins of life.** C. I. Simionescu, F. Denes, and M. Totolin (Institute of Macromolecular Chemistry, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 263-269. 14 refs.

Analyses of the reaction products of an RF cold plasma discharge in a mixture of CH4, NH3, and H2O gases which formed protobiopolymers are reported. Polypeptide and polysaccharide type substances were formed in the presence of dominant concentrations of NH3 and H2O, while methane dominated mixtures yielded lipid-like structures. Spectral analyses, chromatography, gel permeation measurements, elemental analysis, electron microscopy, SEM, and optical microscopy were employed, and it is noted that the lipid-like materials are induced to form specific orientations to the fluid medium and form organized entities with protomembranes. Double layers were found in the microspheres, which had a membrane potential of 30 mV. Microsphere-assisted phosphorylation was investigated starting from KH2PO4, and yielded a polyphosphate, which is considered significant for early bioenergetical processes. M.S.K.

**A82-20937 *** **Terrestrial evolution of polymerization of amino acids - Heat to ATP.** S. W. Fox and T. Nakashima (Miami, University, Coral Gables, FL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 271-276. 10 refs. Grant No. NGR-10-007-008.

Sets of amino acids containing sufficient trifunctional monomer are thermally polymerized at temperatures such as 65 deg; the amino acids order themselves. Various polymers have diverse catalytic activities. The polymers aggregate, in aqueous solution, to cell-like structures having those activities plus emergent properties, e.g. proliferatability. Polyamino acids containing sufficient lysine catalyze conversion of free amino acids, by ATP, to small peptides and a high molecular weight fraction. The lysine-rich proteinoid is active in solution, within suspensions of cell-like particles, or in other particles composed of lysine-rich proteinoid and homopolyribonucleotide. Selectivities are observed. An archaic polyamino acid prelude to coded protein synthesis is indicated. (Author)

**A82-20938** **Potentiometric titration behavior of polyamino acids prepared by thermal polycondensation.** E. Kokufuta and K. Harada (Tsukuba, University, Sakura, Ibaraki, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 277-284. 10 refs.

Potentiometric titrations of thermally prepared polyamino acids were carried out at different ionic strengths. The intrinsic dissociation constants of carboxyl groups or amino groups in the polymers were evaluated by the curves of the apparent dissociation constant against the degree of dissociation and the Henderson-Hasselbalch plots. The ratio of alpha- and omega-linkages of amino acid residues was also evaluated by the analysis of the titration data. (Author)

**A82-20939** **On the polycondensation of amino acid adenylates on montmorillonites.** F. R. Eirich (New York, Polytechnic Institute, Brooklyn, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 285-293. 9 refs.

A number of studies on the mechanisms of adsorption underlying the catalysis mechanism show, at least, three types of adsorption, i.e. two ion exchange mechanisms on clay faces and edges, and a general, possibly ion-pair mediated, polar adsorption. X-ray data on dry clay-peptide sandwiches show clearly adsorption in well defined layers, while analysis of rates of polymerization, of blocking experiments of clay agglomeration, and of the effects of polypeptide preadsorption show that the clay faces and edges are involved in the enhancement of the polycondensation which also requires that the clay platelet stacks can expend by interlayer adsorption during the reaction. (Author)

**A82-20940 *** **Polymerization of serine guanylate in the presence of montmorillonite.** M. Paecht-Horowitz (Jerusalem, Hebrew University, Rehovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 295-299. 7 refs. Grant No. NGR-33-006-070.

Serine guanylate was prepared and its polymerization studied in the presence of montmorillonite and in its absence. In water, without clay, serine guanylate polymerizes in the same way as does serine adenylate. In the presence of montmorillonite, serine guanylate polymerizes to a lesser extent and produces also lower degrees of polymerization than does serine adenylate. It is postulated that the reason for this difference in behavior might lie in the fact that guanylic acid is much more acidic than adenylic acid; hence would bind much more strongly to the edges of montmorillonite and thus, by blocking these sites, would inhibit the catalytic activity of the clay. (Author)

**A82-20941** **Quantum mechanical conformational analysis of aminoacyladenylates - Implication in the origin of life.** H. Broch, D. Cabrol, and D. Vasilescu (Nice, Université, Nice, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 301-308. 16 refs. Research supported by the Centre National de la Recherche Scientifique and Direction des Recherches, Etudes et Techniques.

**A82-20942** **Environmental conditions for the formation of marigranules and kinetic studies on the formation.** H. Yanagawa and F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 309-312. 5 refs.

Highly organized particles, 'marigranules', were found to be produced from glycine and acidic, basic, and aromatic amino acids in a modified sea medium. The marigranules had membrane-like structures and were packed with polymers having molecular weights of 1,800, 6,800, 15,000, and 82,000 daltons. It is considered that these marigranules represent a new type of protocell-like structures that were present on the primitive earth. The environmental conditions for the formation of marigranules are described and kinetic studies made on them are presented. Among amino acids, tryptophan was an essential amino acid for the formation of marigranules and among the metal components of modified sea medium, cupric ion was absolutely necessary for the formation of marigranules. The form of marigranules was dependent on temperature and time. The time course for the formation of these marigranules was oscillatory. (Author)

**A82-20943 *** **Membrane lipids and the origin of life.** J. Oro, G. Holzer, M. Rao (Houston, University, Houston, TX), and T. G. Tornabene (Colorado State University, Fort Collins, CO). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 313-322. 36 refs. Grant No. NGR-44-005-002. Contract No. EE-77-5-02-4478.

The current state of knowledge regarding the development of biological systems is briefly reviewed. At a crucial stage concerning the evolution of such systems, the mechanisms leading to more complex structures must have evolved within the confines of a protected microenvironment, similar to those provided by the contemporary cell membranes. The major components found normally in biomembranes are phospholipids. The structure of the biomembrane is examined, and attention is given to questions concerning the availability of the structural components which are necessary in the formation of primitive lipid membranes. Two approaches regarding the study of protomembranes are discussed. The probability of obtaining ether lipids under prebiotic conditions is considered, taking into account the formation of cyclic and acyclic isoprenoids by the irradiation of isoprene with UV. G.R.

**A82-20944** **Resolution of underivatized amino acids by high pressure liquid chromatography, using chiral eluants.** E. Gil-Av, A. Tishbee, S. Weinstein (Weizmann Institute of Science, Rehovot, Israel), and P. E. Hare (Carnegie Institution of Washington, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 323-330. 15 refs.

Chiral recognition through coordination to a metal ion used in conjunction with a chromatographic mode of operation is reported as a method of improving the techniques of enantiometric analysis. Dissolving a chiral coordination complex in an aqueous mobile phase led to resolution of underivatized amino acids obtained by using as a support either a cation exchange resin or a reversed phase silica gel. Eluates are detected by post-column derivatization to fluorescent compounds. A reversed phase column was found to be more efficient for determining the resolution factor for enantiomer emergence than by use of an exchange resin, and chiral recognition was discovered to occur mainly in the mobile phase. Picomoles of eluate were observable, but only with primary, rather than secondary amino groups. M.S.K.

**A82-20945** **Stereoselective interactions of small biological molecules.** Y. H. Kim, A. Tishbee, and E. Gil-Av (Weizmann Institute of Science, Rahovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 331-336. 19 refs.

Work being done on charge transfer complexation and chiral recognition is surveyed, with attention given to its extension to stationary phases consisting of relatively small biological molecules. The experiments reported deal with the resolution of synthetic molecules, the helicenes, not found in nature. They focus attention on the discrimination of certain optical isomers by biological substances through the combined effect of charge transfer complexation and chiral recognition through a sugar residue. These observations are thought to be of considerable interest since modern carbohydrate chemistry puts much emphasis on the information content of sugars and their functions in molecular recognition. It is noted that, by examining, as stationary phases, a systematically modified series of compounds, the influence of structural factors on chiral recognition could be investigated and eventually a model for the mechanism evolved. C.R.

A82-20948 * **Possible selective adsorption of enantiomers by Na-montmorillonite.** E. Friebele, A. Shimoyama, and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 337-346. 13 refs. NSF Grant No. EAR-77-00013; Grant No. NGR-21-002-317.

Racemic amino acids including (D,L) alpha-alamine, (D,L) alpha-aminobutyric acid, (D,L) valine, and (D,L) norvaline were incubated with Na-montmorillonite at 100% CEC at three hydrogen ion concentrations, and amino acid adsorption was determined by ion exchange chromatography. Enantiomers were analyzed by gas chromatography. Differences in the quantities of D and L enantiomers in any of the fractions was no larger than a few percent. Although a large difference in the adsorption of the amino acid enantiomers was not observed, the analysis may indicate a small preferential adsorption (0.5-2%) of L-amino acids by Na-montmorillonite. V.L.

A82-20949 **Asymmetrical radical formation in beta-irradiated D- and L-alanines.** M. Akaboshi, M. Noda, K. Kawai, H. Maki, and K. Kawamoto (Kyoto University, Osaka, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 373-378. 5 refs.

It was demonstrated that the relative radical concentration was distinguishably higher in D-alanine than in L-alanine when irradiation was carried out by using a yttrium-90 beta-ray source. On the other hand, when irradiation was carried out by using non-polarized beta-rays derived from a Van de Graaf generator, no such difference was observed in the radical formation of both alanines. The results suggested that some process being involved in the parity non-conservation in a beta-decay must play an important role in the observed phenomenon. (Author)

A82-20951 **Competition, coexistence and irreversibility in models of early molecular evolution.** C. Blomberg, G. von Heijne, and O. Leimar (Kungl. Tekniska Hogskolan, Stockholm, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 385-392. 5 refs.

Mathematical models of prebiotic systems are considered for particular applications to the cases of irreversibility and coexistence in early molecular evolution. It is found that irreversibility in biologic systems is not well defined, and several models are considered which are limited by monomer availability. Attention is paid to a linear model, where fitness results in the survival of a specific polymer over another through more successful use of available monomers, to a model of hypercycle growth, where evolution must occur within a cycle by species which require fewer monomers. Consideration is also given to a dimerization model, where different species will coexist while monomer concentrations will decrease, to a model for the incorporation of monomers by one species to form another species, to coexistent hypercycle systems in niches beside one another, and to a steady-state existence between two species unable to eliminate one another, implying coexistence in prebiotic conditions. M.S.K.

A82-20952 * **Histidyl-histidine catalysis of glycine condensation in fluctuating clay environments.** D. H. White and J. C. Erickson (Santa Clara, University, Santa Clara, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 393-397. Research supported by the Research Corp.; Grants No. NCA2-OR-685-708; No. NCA2-OR-685-806.

Histidyl-histidine is a remarkably effective catalyst of peptide bond formation in the reaction of glycine in a fluctuating (hot-dry, cold-wet) clay environment. It has shown turnover numbers (molecules of glycine incorporated in oligoglycines per molecule of catalyst) as high as 18 in a single cycle and as high as 52 overall. A number of other dipeptides were tested, as well as monomeric histidine, N-acetyl histidine, and imidazole, none of which showed turnover numbers greater than one. Histidyl-histidine is a model for a prebiotic protoenzyme, and implications for the development of a simple translation mechanism are discussed. (Author)

A82-20953 **A mathematical method for the enumeration of doublet codes.** G. Cullmann (Institut Georges Gamow, Clermont-Ferrand, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 405-413. 7 refs.

A single nonsense mutation is a mutation of a codon outside its code, wherein only one base changes under the mutation. The best code is one which has the minimum number of single nonsense mutations and, therefore, a definite Hamming's distance. The Hamming's distance (Hamming, 1950) represents the maximum number of codons which differ in one base only. All the codes for a given Hamming's distance can be listed by a process known as combinatory analysis. A simple example of theoretical doublet codes with four bases is presented; it is maintained, however, that the method can be extended to any length, and in particular, to triplet codes. J.F.

A82-20954 * **Evolving nucleotide binding surfaces.** T. Kieber-Emmons and R. Rein (Roswell Park Memorial Institute, Buffalo, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 415-422. 14 refs. Grant No. NsG-7305.

An analysis is presented of the stability and nature of binding of a nucleotide to several known dehydrogenases. The employed approach includes calculation of hydrophobic stabilization of the binding motif and its intermolecular interaction with the ligand. The evolutionary changes of the binding motif are studied by calculating the Euclidean deviation of the respective dehydrogenases. Attention is given to the possible structural elements involved in the origin of nucleotide recognition by non-coded primordial polypeptides. (Author)

A82-20955 **Origin and evolution of the genetic code.** M. Shimizu (Tokyo, University, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 423-430. 23 refs.

A hole on a complex of anticodon and discriminator base on a tRNA has a key hole - key relation to the side chain of the corresponding amino acid. The protein synthesis system might have evolved so that it could have continuously utilized the above stereochemical discrimination scheme. 'Half tRNA' might have been the form of the primitive tRNA and the primitive ribosome might have had a hairpin structure with two CAAGR on both sides of it. (Author)

A82-20956 **The origin and evolution of the genetic code.** A. Figureau (Lyon I, Université, Villeurbanne, Rhône, France) and J.-M. Labouygues (Institut Georges Gamow, Clermont-Ferrand, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 431-437. 13 refs.

A quantitative model is examined, which suggests that the present genetic code appeared under the influence of mutations and evolved by optimizing its resistance to their effects. The number of sense codons grew progressively, whereas the number of terminators decreased. The most important constraint is due to the selection against the appearance of nonsense codons. The competition between ancestor codes favors those which best resist mutational effects leading to nonsense. The structure of the selected systems converges towards that of the present genetic code. (Author)

**A82-20957** **Evolutionary processes of the genetic code.** T. Noguchi (Tokyo College of Economics, Kokubunji, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 439-446. 7 refs.

Evolution of the genetic code is analyzed in terms of codon-reading ability and amino-acid-recognizing ability. Three basic rules are formulated in relation to the codon-reading ability of tRNAs which make it possible to classify the evolution of this ability into seven stages according to the degree of perceptivity of codon-anticodon interaction. Evolutionary trees are presented for tRNAs which show how tRNAs are related to one another. V.L.

**A82-20958** * **Summary of evidence for an anticodonic basis for the origin of the genetic code.** J. C. Lacey, Jr. and D. W. Mullins, Jr. (Alabama, University, Birmingham, AL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 447-456. 27 refs. Grant No. NGR-01-010-001.

This article summarizes data supporting the hypothesis that the genetic code origin was based on relationships (probably affinities) between amino acids and their anticodon nucleotides. Selective activation seems to follow from selective affinity and consequently, incorporation of amino acids into peptides can also be selective. It is suggested that these selectivities in affinity and activation, coupled with the base pairing specificities, allowed the origin of the code and the process of translation. (Author)

**A82-20959** **Primitive transfer RNA and origin of Darwinian system.** M. Ishigami (Jichi Medical School, Minamikawachi, Tochigi, Japan) and M. Kinjo (Utsunomiya University, Utsunomiya, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 457-464. 22 refs.

The effect of polynucleotide and polypeptide on the formation of polypeptide is tested in order to support the theory that the protein synthesis mechanism originated in the stepwise evolution of polynucleotides, which not only activate amino acids, but evolve to produce better polypeptides for probionts as well (Ishigami et al., 1977). The basic protein, histone, is found to promote the reaction of polypeptide formation from aminoacyl adenylate. The relationship between the origin and development of the genetic code and the increase of the invariable site in protein in the course of molecular evolution is discussed. Finally, an analogy is drawn between the learning system and Darwinian evolution. J.F.

**A82-20960** **Evolution of the terrestrial atmosphere and its fossils in biosystems.** M. Shimizu (Tokyo, University, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 465-471. 18 refs.

Various fossil vestiges of C3O2 and HC[illegible]O polymers can be found in the living biosystem, and are thought to have resulted from the presence of CO in the primitive earth atmosphere. The possible evolutional route of the genetic code is derived by combining the discussion of Eigen and Schuster (1978) for the formation of mRNA and that of Egami (1979) for the classification of amino acids and nucleic acid bases in relation to the genetic code. The codes are specified by a series of 3rd-2nd-1st anticodons, and the C4N holes for the terminators are both small. It is found that fossil vestiges of C3O2 appear most clearly in the sequence serine-leucine-phenylalanine, while those of HCHO appear most clearly in the sequence glycine-alanine-asparatic acid. Thus, the classified evolutional route of the genetic code provides good evidence for a primitive environment, especially for a primitive atmosphere consisting of CO and N2. J.F.

**A82-20961** **Organic geochemistry of the Isua supracrustals.** C. Walters, A. Shimoyama, and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 473-479. 21 refs. NSF Grants No. DPP-77-08993; No. DPP-79-00991.

The Isua supracrustals of western Greenland are the oldest terrestrial rocks known, dated at greater than 3,750 m.y. Metamorphosed to lower amphibolite facies, they still can provide indications of their original environment of deposition. Graphite is widely dispersed throughout the meta-sediments, particularly within the ironstones. Most of the graphite is very well ordered. However, several samples show a marked disorder of crystallinity. These samples, when pyrolyzed at high temperatures, liberate organic fragments of low molecular weight (m/e less than 200). The fragments suggest that at least some of the Isua graphite is derived from condensation of kerogen. Carbon isotope data has been interpreted as indication of photosynthetic fractionation. Whether the original organics, which are now seen as graphite, were biologically produced has not yet been unequivocally established. The pyrolyzed organics detected within the meta-sediments may well be the oldest molecular fossils yet found on the earth. (Author)

**A82-20962** **Secondary structures of polypeptides as evolutionary growing points.** H. Baltscheffsky (Stockholm, Universitet, Stockholm, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 481-486. 9 refs. Statens Naturvetenskapliga Forskningsrad Grant No. 2292-100.

The formation of beta-pleated sheet structures in experiments on Clostridia-type ferredoxin apoproteins has revealed secondary structures which may serve to orient appropriate cysteine sulfur residues to bind 2 Fe atoms in two 4(Fe + S) cubes. The beta-structures then disappear, yielding a hydrogen bond change which holds significance in the protein function. Three-dimensional structures are formed by concerted hydrogen bond formation, some in which reversible, functionally useful changes are regarded as evolutionary growing points that are a basis for more complex three-dimensional patterns found in present-day proteins. M.S.K.

**A82-20963** **Search for primitive replicative properties on early polypeptides.** A. Brack and G. Spach (CNRS, Centre de Biophysique Moléculaire, Orléans, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 487-493. 9 refs.

The sequences of polypeptide chains which are built up with alternating hydrophilic-hydrophobic residues concentrate themselves in the beta-pleated sheet conformation when dissolved in salted water. The sheets are more stable than the alpha-helix and are shown to constitute a pathway to the enrichment in one enantiomer. They are considered as a single system with potential template activity. (Author)

**A82-20964** **Emergence of flavin catalysis - An approach based on the concept of bioorganic evolution.** C. M. Visser (Groningen, Rijksuniversiteit, Groningen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 495-504. 37 refs.

Bioorganic chemical analysis of present-day coenzyme mechanisms (via chemical models) can reveal something about the stage of evolution of life in which those cofactors were introduced (and vice versa). Some cofactors date back to the time before the origin of the genetic code (RNA-like metabolism) whereas others are relatively recent. Flavin prosthetic groups are anomalous however, in that they have pre-genetic code structures but a great number of post-genetic code functions (oxygen handling) and reaction mechanisms. The recent isolation of a deazaflavin cofactor from one of the Archaebacteria suggests a possible way out of this dilemma. The significance of this for present-day flavoenzyme mechanisms is discussed. (Author)

**A82-20965** **Selective acylability of amino acids by nonenzymic model reactions of biochemical transacylations.** D. Brice, L. Le Port, and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.

Dordrecht, D. Reidel Publishing Co., 1981, p. 505-511. 18 refs.

The results of experiments on the acylability of various amino acids by differing acyl donors to study the reactions of biochemical transacylations are reported. The reactions were performed in aqueous solutions with no enzymes and a small presence of hydroxyl ions. Data on the acetylation yield obtained from acetylthioglycolate, acetylthiocholine, and acetylphosphate show that the acetylation yields of hydrocarbonated side chain amino acids are highest with acetylthioglyconates, an inversion of the acetylation yields between two thioesters occurs for amino acids which have a thiol function, reactions from the hydroxylated side chain amino acids result in lower acetylation yields, and specifically high acetylation yields are obtained in the case of cysteine and homocysteine acetylation. Finally, it was found that, in the nonenzymatic conditions in primitive synthesis of polypeptides, the hydrophobic character of the amino acid chains influences the NH2 reactivities of the compounds with respect to their acetylation with acetyl donors.
M.S.K.

**A82-20966** **Experiments on transfer of organic molecular information into crystal lattice superstructures.** P. Decker and H. Schweer (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 513-520. 22 refs.

Evolution in bioids, open systems which can exist in several steady states involves the accumulation of information relevant to its selection value, i.e. in the simplest case, the choice by mutation of the most stable steady state (species). Therefore it appears problematical how alien information like nonstatistical structures arising in mineral crystallization or in interplanetary carbon compounds found in meteorites could become incorporated into the terrestrial biosphere. In contrast, an interaction of evolving biosystems with inorganic matter, involving temporal storage of bioinformation in crystal structures, appears more compatible with the bioid concept. A model of how three independent messages can be stored in a three-dimensional lattice is presented. As a first experimental approach, attempts to induce information from linear biomolecules into a nonstatistical distribution of components of mixed crystals are reported.
(Author)

**A82-20967 *** **Phylogenetic sequence of metabolic pathways in Precambrian cellular life.** J. Barnabas (Ahmednagar College, Ahmednagar, India), R. M. Schwartz (National Biomedical Research Foundation, Washington, DC), and M. O. Dayhoff (Georgetown University, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 521-528. 56 refs. Grant No. NIH-GM-08710; Contract No. NASw-3317.

A sequence of major metabolic events is presented as they may have appeared during prokaryote evolution. This is based on (1) the phylogenetic schema derived from sequences of bacterial ferredoxin, 2Fe-2S ferredoxin, 5S ribosomal RNA, and c-type cytochromes; (2) metabolic settings in which these macromolecules are found; and (3) metabolic capabilities of the prokaryotes that carry these molecules.
(Author)

**A82-20968** **Coupling to solar energy: Sensitized photoreactions - The primary source of self-organization.** P. Decker (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 529-536. 31 refs.

Life is modelled as a thermodynamically dissipative mechanism, and the chemical reactions most amenable to the formation of 'bioids' which form and change from one generation to the next are examined. The self-organization is assumed to occur on a planetary surface exposed to 6000 deg light quanta, in the availability of reactive chemicals, with nonenzymatic catalysts being present, and with macromolecules able to mediate the reactivity through catalytic concentration of metal ions. The model is taken to indicate that experimentation should look for photochemical reactions with autocatalytic feedback which yield an organization into cycles in a steady state scenario. The oxidation of methane is mentioned for the production of formaldehyde and the autocatalytic formation of sugars from the formaldehyde, and experiments on a nonenzymatic photophosphorylation is described as an example of the synthesis of energy rich intermediates.
M.S.K.

**A82-20969** **Ultraviolet selection pressure in the Prephanerozoic.** M. B. Rambler (Boston University, Boston, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 537-542. 34 refs.

The late appearance of metaphyta and metazoa in the fossil record has often been attributed to low concentrations of ambient oxygen and restriction of organisms to shielded habitats due to intense ultraviolet selection pressure (Berkner-Marshall hypothesis). Microorganisms examined for survival as a function of UV dosage consistently exhibit a capacity for radiation resistance and repair. Comparisons of lethal UV dosages of various microbes to calculations of present solar UV fluxes at 253.7 nm result in an average radiation tolerance of 30 minutes. However, inspection of survival of protected cells increases radiation tolerance by three orders of magnitude or 24 hours of continual radiation exposure. The observation of protective mechanisms in extant microbes may be legacies from UV exposure in the Prephanerozoic. Radiation resistance taken together with the well preserved microbiota known from the Prephanerozoic suggests the Berkner-Marshall hypothesis to be indefensible.
(Author)

**A82-20970** **DNA-protein complex from an extreme halophile - A histone-like protein in archaebacteria.** M. Ohba and T. Oshima (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 543-549. 17 refs.

**A82-20971 *** **The evolution of blue-greens and the origins of chloroplasts.** R. M. Schwartz (National Biomedical Research Foundation, Washington, DC) and M. O. Dayhoff (Georgetown University, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 551-558. 28 refs. Contract No. NASw-3317; Grants No. NIH-GM-08710; No. NIH-RR-05681.

All of the available molecular data support the theory that the chloroplasts of eukaryote cells were originally free-living blue-greens. Of great interest is what the relationships are between contemporary types of blue-greens and eukaryote chloroplasts and whether the chloroplasts of the various eukaryotes are the result of one or more than one symbiosis. By combining information from phylogenetic trees based on cytochrome c6 and 2Fe-2S ferredoxin sequences, it is shown that the chloroplasts of a number of eukaryote algae as well as the protist Euglena are polyphyletic; the chloroplasts of green algae and the higher plants may be the result of a single symbiosis.
(Author)

**A82-20972 *** **Evolution of the rhodospirillaceae and mitochondria - A view based on sequence data.** M. O. Dayhoff (Georgetown University, Washington, DC) and R. M. Schwartz (National Biomedical Research Foundation, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 559-566. 22 refs. Contract No. NASw-3317; Grant No. NIH-GM-08710.

New sequence data from several protein families and from 5S ribosomal RNA confirm and elaborate a previously proposed description of the phylogenetic connections between a variety of bacteria and the eukaryotes. Probably, the first organisms were nonphotosynthetic anaerobic prokaryotes, which were followed soon by photosynthetic anaerobes. From this photosynthetic stock, the aerobic line to Pseudomonadacae, Rhodospirillaceae, and blue-greens arose. The eukaryotes derived genetic material from the symbioses of at least three separate bacterial lines. Ancestors of Rhodopseudomonas globiformis gave rise to the eukaryote mitochondria, probably through at least three separate symbioses, one early on the flagellate line, one on the ciliate line, and one on the stem to the multicellular forms. (Author)

A82-20973 **On the origin of photosynthetic eukaryotic cells - Cyanidium caldarium as a 'bridge' alga between prokaryotic cyanobacteria and eukaryotic rhodophytes: Evidence from environmental, polysaccharide biochemistry and ultrastructural studies.** J. Seckbach (Jerusalem, Hebrew University, Jerusalem, Israel) and J. F. Fredrick (Dodge Chemical Co., Bronx, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 567-574. 43 refs.

A82-20974 **Microbial life in cold saline environments.** S. B. Leschine, K. J. Miller, and R. L. Huguenin (Massachusetts, University, Amherst, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 575-582. 22 refs.

Microorganisms form Dry Valley (Antarctica) soils, from Great Salt Lake (Utah, USA) water, and from refrigerated salt codfish were enriched and isolated at 5 C in media containing high concentrations of salts. The microbial flora that developed varied considerably depending on the source of the inoculum. A variety of morphologically distinct microorganisms was isolated. Most isolated strains grew over a wide range of temperature (e.g., 0-25 C) and salt concentration (e.g., 0.1-2 M NaCl) suggesting that the evolutionary strategy for adaptation of these organisms to low temperature and high salt involved an increased tolerance of (rather than dependance on) these extreme conditions. (Author)

A82-20975 * **Mutagens and carcinogens - Occurrence and role during chemical and biological evolution.** A. Giner-Sorolla (Sloan-Kettering Institute for Cancer Research, New York, NY) and J. Oro (Houston, University, Houston, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 583-588. 28 refs. Grants No. NIH-CA-08748; No. NGR-44-005-002.

The roles of mutagenic and carcinogenic substances in early biologic evolution is examined, along with terrestrial and extraterrestrial sources of mutagens and carcinogens. UV solar radiation is noted to have served to stimulate prebiotic life while also causing harmful effects in plants and animals. Aromatic compounds have been found in meteorites, and comprise leukemogens, polycyclic hydrocarbons, and nitrasamine precursors. Other mutagenic sources are volcanoes, and the beginning of evolution with mutagenic substances is complicated by the appearance of malignancies due to the presence of carcinogens. The atmosphere of the Precambrian period contained both mutagens and early carcinogens and, combined with volcanic activity discharges, formed an atmospheric chemical background analogous to the background ionizing radiation. Carcinogenesis is concluded to be intrinsic to nature, having initiated evolution and, eventually, cancer cells. M.S.K.

A82-20976 **Could the biochemical metabolism be different.** R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 589-599. 8 refs.

The inevitableness of life having formed from the reactivities of carbonaceous molecules with derivatives of oxygen, sulfur, nitrogen, phosphorus, and some metallic ions and complexes is examined. Consideration is given to redox processes, condensations, the synthesis of chemical bonds, additional bonds, reciprocal eliminations, enol-oxo polymerizations, and the isoprenyl pyrophosphate polycondensations. Restrictions for biochemical processes are defined, and standard potentials which define the transition from a nonoxydized carbon atom to an alcohol or ethylenic group, alcohol to an aldehydic or ketonic group, and an aldehydic group to a carboxylic group are explored. The transitions are found to occur at the lowest energy levels possible, considering that they take place at room temperature. Life then formed from reactions which were determined from the physico-chemical properties of the carbonaceous compounds in aqueous media. M.S.K.

A82-21208 * **Organic and inorganic interpretations of the Martian UV-IR reflectance spectrum.** K. D. Pang, J. M. Ajello (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), S. F. S. Chun (California, University, San Francisco, CA), Z. Nansheng (Beijing Planetarium, Beijing, People's Republic of China), and L. Minji (Beijing Glass Institute, Beijing, People's Republic of China). *Nature*, vol. 295, Jan. 7, 1982, p. 43-46. 45 refs. NASA-sponsored research.

Viking Lander biology experiment gas chromatography-mass spectrometer analysis has detected no organic molecules above a concentration of parts per billion. The questions considered here include the reason for the lack of organic molecules at the landing sites, whether the sterility of the two sites is representative of the whole of Mars, and whether there may be locations more conducive to organic compound formation and preservation. After simulating the destruction of organic compounds in Mars-like laboratory conditions and examining whether the destructive mechanism might obtain throughout the planet, UV and IR reflectance spectra are re-examined for any evidence of organic molecules and an upper limit is determined for organic carbon content of average Martian soil. It is found that the average Martian soil is poor in inorganics, presents a poor habitat for carbon chemistry-based life forms, and is not likely to preferentially preserve such organisms anywhere on the planet. O.C.

A82-21213 **Body temperature changes during the practice of g Tum-mo yoga.** H. Benson, J. W. Lehmann (Beth Israel Hospital, Boston, MA), M. S. Malhotra (Netaji Subhas National Institute of Sports, Patiala, India), R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, MA), J. Hopkins (Virginia, University, Charlottesville, VA), and M. D. Epstein (Harvard University, Boston, MA). *Nature*, vol. 295, Jan. 21, 1982, p. 234-236. 16 refs. Research supported by the American Institute of Indian Studies, Fleischmann Foundation, and Fetzer Foundation; NSF Grant No. INT-80-16982; Grants No. NIH-HL-22727; No. NIH-HL-07374.

It is reported that three practitioners of the Tibetan Buddhist meditational practice known as g Tum-mo, or heat yoga, have exhibited the capacity to deliberately increase the temperature of their fingers and toes by as much as 8.3 C. Skin temperatures were measured in the area of the navel and lumber region, the nipple, the left forearm, the left fifth finger nailbed, the left calf, the left toe nailbed, and the forehead. The ages of the three subjects were 46, 50 and 59 years. It is suggested that the physiological mechanism responsible for the marked increase of finger and toe temperature recorded is vasodilation. O.C.

A82-21299 **Microelectronics and computers in medicine.** J. D. Meindl (Stanford University, Stanford, CA). *Science*, vol. 215, Feb. 12, 1982, p. 792-797. 56 refs.

Computer use in medicine and medical research is discussed, along with the applications of microelectronics in biosystems. Systems for experimentation demand consideration of the uses of microelectronic sensors for acquiring data bases and for implantable telemetry. Data gathered from 'under the skin' are much harder than personal descriptions of medical history, and can be directly input to a computer for analysis. The computer's role in medical decision-making processes is examined, including the implications of CAT scans as an effective diagnostic tool. Numerous routine and specially ordered hospital tests can be automatically performed under computer control, and the data stored, correlated, and selectively displayed on demand. Additionally, results which are regarded as abnormal can be scanned for automatically and the physician notified. M.S.K.

A82-21454 # **Electroencephalographic correlates of the hemispheric functional asymmetry in the human brain (Elektroentsefalograficheskie korreliaty funktsional'noi asimmetrii bol'shikh polusharii mozga cheloveka).** E. A. Zhirmunskaia, V. S. Losev, and T. P. Evpakova (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 13, Jan.-Mar. 1982, p. 42-65. 58 refs. In Russian.

Recent work concerning the background electroencephalographic correlates of the functional asymmetry of the left and right cerebral hemispheres connected with speech, visual, auditory or spatial perception, and other forms of mental activity is reviewed. Following a brief summary of current formulations of the problems of the relation of psychological and physiological phenomena and hemispheric asymmetry in performing the same functions on different levels, a review is presented of the goals, methods and results of experimental studies in the literature of the past 3-4 years. Attention is then given to the results of three series of experiments conducted by the present authors concerning the general characteristics of EEG changes during changes in cerebral functional condition, EEG changes in different regions of the brain, and EEG changes in different cerebral functional conditions. The potential of electroencephalography for further studies of hemispheric functional asymmetry and interactions is also discussed. A.L.W.

**A82-21455** † **The structural and functional organization of the ventrolateral nucleus of the thalamus (Strukturno-funktsional'naia organizatsiia ventrolateral'nogo iadra talamusa).** L. V. Cherenkova and A. S. Batuev (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 13, Jan.-Mar. 1982, p. 66-88. 163 refs. In Russian.

Literature data concerning the structure and functional organization of the ventrolateral nucleus (VLN) of the thalamus and its connections with various brain structures engaged in the processing of information necessary for the integration of motor activity is reviewed. The three types of neurons making up two zones of the VLN are distinguished, and connections of the VLN are examined, including somatic afferents, afferents from the cerebellum, fornix, thalamic nuclei and cortex, and efferents to the sensorimotor cortex. The structural data are noted to suggest that the VLN plays an important role in the organization of the cerebellar-thalamic-cortical system. Physiological data on neuronal activity, the control of cerebellar impulse transmission, control on the part of the cortex and the role of the VLN in motor organization is considered, and the role of the structure in filtering sensory information to allow the initiation and realization of motion is emphasized. A.L.W.

**A82-21456** † **Cellular mechanisms of the Frank-Starling phenomenon (Kletochnye mekhanizmy fenomena Franka-Starlinga).** V. Ia. Izakov, V. S. Markhasin, Iu. L. Protsenko, and O. N. Bershitskaia (Sverdlovskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 13, Jan.-Mar. 1982, p. 89-108. 100 refs. In Russian.

Recent data concerning the cellular basis for the relation between length and tension discovered in skeletal and myocardial muscle by Frank and serving as the basis of Starling's law of the heart is reviewed. The general characteristics of the relation between initial muscle length and isometric contraction in skeletal muscle and the myocardium are discussed, and ultrastructural evidence is presented which shows that changes in the overlap between the thick and thin sarcomeric filaments are insufficient to explain the length-tension relation. Studies of the influence of initial length on the calcium activation of myofibrils are then presented which demonstrate that inotropic factors act through both electromechanical coupling and calcium activation to influence contractile forces. A.L.W.

**A82-21457** † **Change in the cytochemical indicators of carbohydrate metabolism in the peripheral blood neutrophils of pilots (Izmenenie tsitokhimicheskikh pokazatelei uglevodnogo obmena neitrofilov perifericheskoi krovi letchikov).** P. S. Pashchenko. *Voenno-Meditsinskii Zhurnal*, Dec. 1981, p. 52, 53. In Russian.

Glycogen levels and phosphorylase enzyme activities in the peripheral blood neutrophils of pilots are measured as indicators of the effects of flight stress on carbohydrate metabolism and physiological condition in general. Blood samples were taken from 21 pilots 1 to 1 1/2 hours before and 10 to 15 min after flight, and compared with those of age-matched healthy controls. In 82% of the subjects, preflight glycogen levels are found to be about equal to or even exceed control values. Post-flight glycogen levels are observed to depend on the preflight values, increasing in those with initially low values, decreasing in those with slightly higher levels, and remaining the same for those with normal or greater than normal values. The results are explained in terms of the effects of sympatho-adrenal and parasympathetic hormones on the activity of the phosphorylase enzyme, which activates the cellular breakdown of glycogen. A.L.W.

**A82-21470** † **Filtration properties of receptive fields of visual-cortex neurons (Fil'tratsionnye svoistva retseptivnykh polei neironov zritel'noi kory).** Iu. E. Shelepin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 261, no. 6, 1981, p. 1506-1509. 8 refs. In Russian.

An analysis is presented of the amplitude spatial-frequency characteristics of the neuron receptive fields in the visual cortexes of 36 cats. The general filtration properties (i.e., the isolation of spatial frequency and image orientation) were determined for receptive fields situated in various projection zones of the visual cortex, and a relationship between image orientation, spatial frequency, and neuron response was established. B.J.

**A82-21676** **Effects of long-term exposure to low levels of ozone - A review.** C. E. Melton (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 105-111. 39 refs.

Available literature regarding long-term effects of ozone on animals and humans is reviewed. This review shows that ozone concentration is more important than duration of exposure in determining the effects of an ozone exposure. This conclusion calls into question the validity of the time-weighted average as an index of severity of ozone exposure. The literature review further reveals a wide variation in susceptibility of different animal species to ozone, making it difficult to apply results of animal experiments to humans. It further appears that a dose of ozone that is acutely innocuous is also innocuous over the long term. The effects of a symptom-producing dose of ozone are initially cumulative for the first two or three exposures; then an adaptive response may ensue that involves a plateau of response or even a reversal. These effects are shown by both animals and humans. The mechanisms are unknown. Ozone probably causes damage by free radical formation. Free radical scavengers, such as vitamins E and C, may provide protection against ozone damage. (Author)

**A82-21677** **A study of treadmill exercise protocols for Chinese males.** B.-L. Ho (Institute of Aviation Medicine, Taipei, Republic of China). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 112-116. 14 refs. Research supported by the National Science Council of the Republic of China.

**A82-21678** **The effect of two years' training of aerobic power and muscle strength in male and female cadets.** W. L. Daniels, J. E. Wright, D. S. Sharp, D. M. Kowal, R. P. Mello, and R. S. Stauffer (U.S. Army, Research Institute of Environmental Medicine, Natick, MA; U.S. Military Academy, West Point, NY). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 117-121. 10 refs.

The considered investigation is concerned with a comparison of the responses of male and female cadets to extended military training at the U.S. Military Academy. During the course of the study, the training program of both male and female cadets was similar and, in some respects, identical. Volunteer cadets, 11 males and 7 females, completed all phases of this study. On all strength measures, the values for female cadets averaged approximately 30-40% lower than for males. The female cadets did not significantly narrow the gap with male cadets in terms of muscle strength and aerobic power, even after 2 years of similar training. These results indicate that post-pubertal females are unable to reduce the difference between themselves and males, even after extended training in a situation where many social, cultural, and environmental factors are very similar. G.R.

**A82-21679** **Psychological testing at high altitudes.** M. Nelson. *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 122-126. 20 refs.

Psychological testing was done on 20 subjects at various altitudes (sea level, 3,810 m, and 5,000 m) during a 35-d mountaineering expedition to Denali (Mt. McKinley). Intellectual functioning and personality changes were studied. While little variation was noted at the lower altitude, at 5,000 m there was a marked deterioration in cognitive ability. This was accompanied by a sharp increase in paranoia and obsessive-compulsiveness and smaller increases in depression and hostility. (Author)

**A82-21680** **Effects of relative metabolic rate and heart rate variation on the performance of flight attendants.** T. Yoshioka, M. Narusawa, K. Nagami, C. Yabuki, Y. Nakahara, S. Nakano (Tokai University, Isehara, Japan), C. Sekiguchi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan), K. Noda (Japan Air Line Co., Ltd., Health Control Service Div., Tokyo, Japan), T. Nagai, and Y. Kobayashi (Jikei University, Tokyo, Japan). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 127-132. 15 refs.

**A82-21681** **Regional distribution of cardiac output in unanesthetized baboons during +Gz stress with and without an anti-G suit.** M. H. Laughlin, J. W. Burns, and M. J. Parnell (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 133-141. 43 refs.

The F-16 and other recently developed high-performance aircraft can produce levels of +Gz (head-to-foot acceleration) which may exeed man's physiologic tolerance for +Gz stress. In this connection, it is pointed out that the effects of +Gz on regional flow and resistance in humans have remained a subject for conjecture. An investigation was, therefore, conducted to obtain information regarding this important subject. Eight female baboons were used in the experiments, because the baboon is a subhuman primate which is phylogenetically close to man. The results of the experiments demonstrate that, in baboons, +Gz stress causes a significant decrease in cardiac output and a redistribution of blood flow away from visceral organs. Acceleration exposure had no statistically significant effect on blood flow to the cerebrum, cerebellum, or brain stem. G.R.

**A82-21682** * **The effects of horizontal body casting on blood volume, drug responsiveness, and +Gz tolerance in the rhesus monkey.** D. T. Dickey, G. E. Billman, K. Teoh, H. Sandler, and H. L. Stone (Oklahoma, University, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 142-146. 18 refs. Grant No. NsG-2282.

To simulate the weightless condition, eight rhesus monkeys, instrumented with solid-state pressure transducers, were horizontally restrained in body casts for 28 days. Blood volume decreased an average of 13% after 14 days of restraint, due mainly to a drop in plasma volume. Aortic pressure and heart rate responses to norepinephrine and phenylephrine decreased after 14 days of restraint. The monkeys did not show a statistically significant decreased tolerance to a 90 deg sudden upright tilt after horizontal restraint. During the fifth week of casting, four animals were subjected to +Gz acceleration tests on a centrifuge. The acceleration tolerance of the casted monkeys was significantly reduced compared to four similarly instrumented control animals. These findings indicate that the cardiovascular deconditioning associated with simulated weightlessness results from an inability to maintain central blood volume during orthostatic stress. (Author)

**A82-21683** **Acceleration induced voltage variations in the electrocardiogram during exhaustive simulated aerial combat maneuvering.** J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 147-152. 34 refs.

A description is presented of the effects of exhaustive simulated aerial combat +Gz stress on the amplitudes of the P, QRS, and T waveforms as seen on the surface electrocardiogram. Twenty-two healthy males were exposed to an exhaustive simulated aerial combat maneuver (SACM) +Gz profile. It was found that marked changes in the electrocardiographic amplitudes occur as a result of exhaustive SACM + Gz stress. Positional, pressure/volume, humoral and electrolyte changes may all be significant causative factors either alone or in combination. Attention is given to T-wave response to exercise and training, hyperkalemia as an etiology for T-wave changes, T-wave response to +Gz stress, catecholamines as an etiology for T-wave changes, QRS response to exercise and clinical considerations, and QRS response to +Gz stress. G.R.

**A82-21684** **Posturography of ataxia induced by Coriolis- and Purkinje-effects.** C. Fitger and T. Brandt (Alfried Krupp von Bohlen und Halbach Krankenhaus, Essen, West Germany). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 153-161. 33 refs. Research supported by the Deutsche Forschungsgemeinschaft.

One aim of the study is to provide information on clinical vertigo symptoms. Standing on a rotatable stabilometer, 25 healthy subjects execute lateral head tilts during (Coriolis), or after (Purkinje), rotation with different constant velocities. The conditions are varied with respect to eyes open vs eyes closed, head upright vs head tilted to the right and left, direction of rotation (clockwise vs counterclockwise), head tilt (active vs passive), and body rotation (active vs passive). The results are as expected in that destabilization is less severe with open than closed eyes and that sway amplitudes are increased after head tilt as well as with a higher velocity of rotation. The direction of the induced body shift is also as expected, opposite to the initial vestibular stimulus. A forward shift after stop without head tilt is frequently found, being independent of the previous direction of rotation. Reported perceptions coincide mostly not with the initial vestibular signal but with the actual movement of compensation. C.R.

**A82-21685** **A statistical examination of three approaches for predicting motion sickness incidence.** D. E. Smith (Desmatics, Inc., State College, PA). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 162-165. 6 refs. Contract No. N00014-74-C-0154. NR Project 207-037.

This paper examines three approaches which have been suggested for predicting motion sickness incidence (MSI) for actual or simulated broadband ship motion. Although only a small amount of empirical MSI data exists for motion other than that produced by a single sinusoid, this data provides strong statistical evidence that two approaches based on single sinusoid models fail to produce accurate predictions. Statistical judgments about a least-squares weighting approach must be reserved until enough data exists to provide an adequate test. In view of these results, it must be concluded that much empirical research remains to be done in order to develop a reasonably accurate method of predicting motion sickness incidence for broadband motion. (Author)

**A82-21686** **Difference between eye closure and visual stabilization in the control of posture in man.** P. P. Vidal, A. Berthoz, and M. Millanvoye (CNRS, Laboratoire de Physiologie Neurosensorielle; Conservatoire National des Arts et Métiers, Paris, France). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 166-170. 11 refs.

Stabilizing the visual surroundings of human subjects influences postural control during perturbations of their equilibrium. The latency of the first EMG burst is increased and its amplitude is reduced. Body pitch is 36 percent stronger than with normal vision. Eye closure does not produce any significant modification of muscular responses and postural performance. This result explains why vision is not considered a rapid source of postural reaction. Eye closure cannot be considered to be visual deprivation. (Author)

**A82-21687** **Cardiovascular origins of heatstroke pathophysiology - An anesthetized rat model.** A. J. Kielblock, N. B. Strydom (Chamber of Mines Research Organization, Johannesburg, Republic of South Africa), F. J. Burger, M. Manjoo (Durban-Westville, University, Durban, Republic of South Africa), and P. J. Pretorius (Potchefstroom University for Christian Higher Education, Potchefstroom, Republic of South Africa). *Aviation, Space, and Environmental Medicine*, vol. 53, Feb. 1982, p. 171-178. 43 refs.

A reappraisal of the nature and sequence of early circulatory responses to heat stress is undertaken by subjecting male albino rats to an environmental temperature of 45 C at 15% relative humidity until overt circulatory failure occurs. Although the initial circulatory responses are normal for mild exertion, an inapparent circulatory crisis develops, which is thought to be a result of the abolishment of compensatory splanchnic vasoconstriction. The impending threat of functional hypovolemia is, temporarily at least, obscured by cardiac compensation; the extent of cardiovascular commitments may, therefore, have been underestimated. This also indicates that cardiovascular adjustments during the stress of heat may prove to be an essential feature of heatstroke pathophysiology. C.R.

**A82-21700** **The prevalence of visual deficiencies among 1979 general aviation accident airmen.** J. R. Dille and C. F. Booze, Jr. (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 179-182. 5 refs.

The reported study of 1979 accidents shows that the relatively small number of pilots with aphakia and artificial lens implants, as well as the total eye pathology population, had significantly higher accident rates, but the monocular pilots did not. There are questions about the functional importance of 20/30 and 20/40 best corrected visual acuity in one case, and entry of 'no fusion' in another, and the dynamic, peripheral, depth and accommodative performance of several with appreciable pathology who have a corrected central acuity of 20/20. It is recommended to continue investigations of the considered type. The obtained findings should be taken into account in the design of research on contemporary problems in aviation medicine. Meanwhile, continuing emphasis must be placed on the accurate measurement of visual functions required for medical certification in communications with FAA aviation medical examiners. G.R.

**A82-21701** † **The economy of muscular work during unfused tetanus (Ekonomichnost' raboty myshts v rezhime zubchatogo tetanusa).** V. S. Gurfinkel' and Iu. S. Levik (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, Mar.-Apr. 1981, p. 371-373. In Russian.

The economy of skeletal muscle work, defined as the relation between tension produced and energy utilized in a given time, during the three stages of unfused tetanus in humans is investigated. Measurements of intramuscular temperature were made under local blood arrest during sustained isometric tetanus of the flexor digitorum superficialis stimulated at a frequency of 9.5 pulses/sec, and compared with measurements of the tension of the second phalange of the fourth finger. The rate of temperature rise is found to be greatest in tetanus phase II, which is characterized by the largest tension oscillations and extends from the 5th to the 30th second of contraction. The economy of muscle contraction is accordingly 1.3 to 1.7 times lower at this stage than at the beginning of tetanus. In phase III, where increased mechanical efficiency is obtained, the muscle economy is also found to rise progressively, reaching a final level 3.5 times greater than initial by the 40-50th second of contraction. A.L.W.

**A82-21702** † **A mathematical model of cell populations with stem cells (Matematicheskaia model' kletochnoi populiatsii so stvolovymi kletkami).** A. M. Zhabotinskii (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR). *Biofizika,* vol. 26, Mar.-Apr. 1981, p. 329-332. 7 refs. In Russian.

The principal properties of stationary tissue populations are explained within the framework of a hypothesis stating that the binding of chalone, a tissue inhibitor, by a stem cell results in asymmetric cell division with the formation of a daughter stem cell and a partially differentiated cell. A chalone-free stem cell divides symmetrically yielding two daughter stem cells. V.L.

**A82-21703** † **Functional model of the conversion of stationary signals in the auditory analyzer (Funktsional'naia model' preobrazovaniia statsionarnykh signalov v slukhovom analizatore).** E. G. Kernitskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biofizika,* vol. 26, May-June 1981, p. 517-521. 14 refs. In Russian.

A model for spectral processing in the auditory analyzer is developed which consists of three layers: (1) a layer of filters whose characteristics imitate the masking curves; (2) a layer of nonlinear converters whose nonlinearity parameters are chosen in such a way that the calculated results correspond to the basic characteristics of the perception of stationary-signal loudness; and (3) a layer of lateral inhibition. This model can distinguish the formant structure of sound in a synthetic speechlike signal; at low frequencies up to 1000 Hz the first harmonics are distinguished in addition to the formants. B.J.

**A82-21704** † **Differentiation of muscles on the basis of trace-element composition (Razlichiia myshts po mikroelementnomu sostavu).** M. M. Ogievetskaia (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR), O. D. Maslov (Ob'edinennyi Institut Iadernykh Issledovanii, Dubna, USSR), and N. S. Shelud'ko (Akademiia Nauk SSSR, Institut Biologii Moria, Vladivostok, USSR). *Biofizika,* vol. 26, May-June 1981, p. 512-516. 7 refs. In Russian.

X-ray fluorescence analysis was used to perform a comparative evaluation of the compositions of trace elements in phasic and tonic muscles of the scallop Patinopecten Yessoensis. It is shown that the phasic muscles are richer in Fe and Cu, while the tonic muscles are richer in Zn, Br, and Sr; there is no difference in Rb content. The results make it possible to classify Fe, Cu, Zn, Br, and Sr according to their properties connected with various homeostatic requirements of the muscles with respect to the trace elements. B.J.

**A82-21705** † **Rhodopsin aggregation under the damaging effects of light on the photoreceptor membranes (Agregatsiia molekul rodopsina pri povrezhdaiushchem deistvii sveta na fotoretseptornye membrany).** I. D. Pogozheva, V. A. Kuznetsov, I. B. Fedorovich, V. A. Livshits, M. A. Ostrovskii, and N. M. Manoshkina (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 692-700. 20 refs. In Russian.

Rhodopsin aggregation and structural changes in the photoreceptor membranes under the damaging effects of visible light are investigated. The rotational mobility of spin-labeled rhodopsin in the photoreceptor membrane was studied by means of saturation-transfer ESR spectroscopy, and concentrations of various rhodopsin oligomers, rhodopsin SH-group oxidation levels and the degree of lipid membrane peroxidation were determined in suspensions of frog outer segment rods irradiated at 100,000 lux. Photooxidation of the photoreceptor membrane is found to lead to a reduction in rhodopsin mobility within the membrane which is attributed to the irreversible molecular aggregation as a result of the formation of disulphide bonds between hydrophobic SH groups on the rhodopsin molecule. A decrease in lipid microviscosity and degree of order is observed upon membrane photodestruction, in contrast to the significant increase in microviscosity observed upon oxidation in the presence of Fe ions. Lipid oxidation is also shown to accelerate protein aggregation, which in turn influences the lipid bilayer. A.L.W.

**A82-21706** † **The relationship between carbohydrate and lipid metabolisms in muscle cell energetics under the influence of ATPase loading - Mathematical model (Sootnoshenie uglevodnogo i lipidnogo obmenov v energetike myshechnykh kletok pri deistvii ATFaznoi nagruzki - Matematicheskaia model).** V. V. Dynnik (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 712-718. 17 refs. In Russian.

**A82-21707** † **The dynamics of muscular relaxation following unfused tetanuses of different durations (Dinamika myshechnogo rasslableniia posle zubchatykh tetanusov razlichnoi dlitel'nosti).** V. S. Gurfinkel' and Iu. S. Levik (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 709-711. 10 refs. In Russian.

**A82-21708** † **Effect of calcium on the temporal characteristics of muscle contraction (Vliianie kal'tsiia na vremennye kharakteristiki myshechnogo sokrashcheniia).** A. E. Bukatina, M. F. Chaplii, and L. L. Alievskaia (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 749-751. 15 refs. In Russian.

It is shown that the time constant of the delayed tension of m. psoas fibers in rabbits increases with calcium concentration in the medium. This dependence becomes less pronounced in the presence of inorganic phosphate. Results of the study suggest a possible link between bridges via a reaction product. V.L.

**A82-21709** † **The possibility of using mathematical methods for predicting the results of the surgical treatment of patients with vasorenal hypertension (O vozmozhnosti ispol'zovaniia matematicheskikh metodov dlia prognozirovaniia rezul'tatov khirurgicheskogo lecheniia bol'nykh vasorenal'noi gipertoniei).** G. S. Krotovskii, M. M. Ellanskii, A. N. Shcherbiuk, S. A. Turpitko, and S. V. Suris (I

Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 32-36. In Russian.

**A82-21710 † Investigation and evaluation of cardiac arrhythmias in healthy young persons (Issledovanie i otsenka narushenii ritma serdtsa u molodykh zdorovykh liudei).** A. G. Dembo and E. V. Zemtsovskii (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 51-55. 23 refs. In Russian.

The incidence of cardiac arrhythmias in athletes was investigated by performing EKG examinations (continuous recording of 100 cardiac cycles) on 1293 young athletes and 482 young nonathletes. The athletes were found to have disorders of the heart rhythm in a statistically significant higher proportion of cases. Depressed activity of the sinus pacemaker was especially common, indicating arrhythmias of the depressed sinus node and extrasystoles. These disorders are due to pathological changes related to the foci of chronic infections, myocardial dystrophy due to chronic physical overexertion, and marked myocardial hypertrophy. B.J.

**A82-21711 † Changes in the main characteristics of the central hemodynamics of healthy individuals and hypertension patients during physical exercise (Izmenenie osnovnykh pokazatelei tsentral'noi gemodinamiki u zdorovykh i bol'nykh gipertonicheskoi bolezn'iu pri fizicheskoi nagruzke).** A. I. Minovich and T. G. Vatsadze (Akademiia Nauk Gruzinskoi SSR, Institut Klinicheskoi i Eksperimental'noi Kardiologii, Tiflis, Georgian SSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 44-47. 17 refs. In Russian.

**A82-21712 † The role of natriuresis in the prophylactic effect of adaptation to hypoxia in the case of hereditary hypertension (Rol' natriiureza v profilakticheskom effekte adaptatsii k gipoksii pri nasledstvennoi gipertonii).** F. Z. Meerson, N. A. Barbarash, G. Ia. Dvurechenskaia, and N. S. Prokina (Akademiia Meditsinskikh Nauk SSSR, Moscow; Kemerovskii Meditsinskii Institut, Kemerovo, USSR). *Kardiologiia,* vol. 21, July 1981, p. 25-32. 27 refs. In Russian.

Experiments on male Wistar rats and rats with spontaneous hereditary hypertension (SHH) showed that the development of SHH was accompanied by a significant decrease in the renal excretion of water and sodium. Acute hypoxia in Wistar rats resulted in a significant decrease in diuresis, glomerular filtration, and K and (insignificantly) Na excretion, while in SHH rats acute hypoxia increased diuresis significantly and enhanced Na and K excretion. Adaptation to hypoxia during six hours per day resulted in an increase of diuresis, glomerular filtration, Na excretion, and the Na/K coefficient of urine in both Wistar and SHH rats. During the first month of adaptation changes were more pronounced in SHH rats than in Wistar rats; as a consequence, the hypertension did not develop in SHH rats. It is concluded that the natriuretic effect is probably the main mechanism of the prophylactic effect of adaptation to hypoxia on the development of hereditary hypertension. B.J.

**A82-21713 † The effect of motor activity on the development of cardiac arrhythmias in experimental emotional stress (Vliianie dvigatel'noi aktivnosti na vozniknovenie serdechnykh aritmii pri eksperimental'nom emotsional'nom stresse).** L. S. Ul'ianinskii, T. G. Urmancheeva, E. P. Stepanian, A. A. Fufacheva, A. V. Gritsak, B. A. Kuznetsova, and A. A. Kvitka (Akademiia Meditsinskikh Nauk SSSR; Moskovskii Inzhenerno-Fizicheskii Institut, Moscow, USSR; Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 64-67. 18 refs. In Russian.

Investigations on monkeys and rabbits have shown that emotional stress can produce various disorders of the heart rhythm: sinus tachycardia, atrial fibrillation, ventricular extrasystoles, and paroxysmal ventricular tachysystoles. Under these conditions the adrenaline content in the blood and myocardium increases three-to-four times, while the noradrenaline level increases in the blood and decreases in the myocardium. Marked motor activity leads to an increase of the adrenaline and noradrenaline level in the myocardium and to the development of disorders of cardiac rhythm including ventricular fibrillation. B.J.

**A82-21714 † Peculiarities of the middle ear structure in rodents as an index of the frequency tuning of their auditory system (Osobennosti stroeniia srednego ukha gryzunov kak pokazatel' chastotnoi nastroiki slukhovoi sistemy).** V. N. Movchan and I. N. Orlova. *Leningradskii Universitet, Vestnik, Biologiia,* Aug. 1981, p. 85-90. 17 refs. In Russian.

**A82-21715 † Adaptation to high-altitude hypoxia at different ambient temperatures /before and during adaptation/ (Adaptatsiia k gornoi gipoksii v usloviiakh raznykh /predvariaiushchei i soprovozhdaiushchei/ temperatur vneshnei sredy).** I. B. Khodzhamberdiev, N. M. Iartsev, A. A. Altymyshev, and A. A. Aidaraliev (Akademiia Nauk Kirgizskoi SSR, Institut Organicheskoi Khimii, Frunze, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* Mar.-Apr. 1981, p. 55, 56. 6 refs. In Russian.

Rats and male rabbits were tested for adaptation to high-altitude hypoxia at ambient temperature ranges of 9-13 C and 22-27 C. It is found that distrophic processes in the myocardium, kidneys, and skeletal muscles are exacerbated during adaptation in the lower-temperature range. B.J.

**A82-21716 † Functional characteristics of receptors connected with sustaining the flight of the roach Periplaneta Americana L (Funktsional'nye osobennosti retseptorov, sviazannykh s podderzhaniem poleta tarakana Periplaneta Americana L).** S. V. Iagodin and V. L. Sviderskii (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 250, no. 5, 1980, p. 1277-1280. 14 refs. In Russian.

**A82-21717 † Evaluation of safety of decompression from the critical volume of gas bubbles formed in the organism (Printsip otsenki bezopasnosti dekompressii po kriticheskomu ob'emu gazovykh puzyr'kov, obrazovavshikhsia v organizme).** V. P. Nikolaev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 255, no. 1, 1980, p. 246-249. 12 refs. In Russian.

A decompression safety criterion is proposed whereby decompression is considered safe if no tissue of the human organism contains more than the critical amount of gas bubbles which varies with tissue types. The proposed criterion is shown to be valid for both multiple-step and single-step decompression. V.L.

**A82-21718 † The dynamics of protein and nucleic acid content in rat raphe nucleus cells after total deprivation of sleep /in a rotating cylinder/ and selective deprivation of its paradoxical phase (Dinamika soderzhaniia belkov i nukleinovykh kislot v kletkakh iader shva krysy pri polnom lishenii sna /v tretbane/ i selektivnom lishenii ego paradoksal'noi fazy).** U. M. Malikov and A. N. Panov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 257, no. 2, 1981, p. 501-503. 15 refs. In Russian.

**A82-21719 † Oxygen transport in dogs native to high altitudes during exercise (Transport kisloroda u sobak-aborigenov vysokogor'ia pri fizicheskikh nagruzkakh).** M. V. Balykin (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* Mar.-Apr. 1981, p. 66-72. 24 refs. In Russian.

Parameters characterizing oxygen transport during exercise of stepwise increasing intensity are investigated in dogs native to high altitudes. Measurements of blood pH, oxygen and carbon dioxide tensions, acid-base balance, temperature and hemoglobin concentration in arterial and venous blood were made in dogs native to altitudes of 760 m and 2700 m at rest and during 10-min recovery periods between treadmill exercise at speeds of 5, 10, 15 and 20 km/h. At rest, the high-altitude dogs exhibit a shift in acid base-balance towards the side of respiratory alkalosis with respect to the controls, as well as high arterial blood oxygenation and oxygen utilization in the presence of reduced oxygen transport. Moderate exercise under low-altitude conditions is observed not to decrease arterial blood oxygenation, while intense muscular work may lead to arterial hypoxemia. Exercise in mountain natives, however, induces a slight reduction in arterial oxygenation and a marked venous hypoxemia. Results demonstrate the efficiency of the respiratory and circulatory systems of high-altitude natives during exercise. A.L.W.

**A82-21720** † **Disturbances in biological rhythms as a result of a conflict of incompatible stimuli (Narusheniia biologicheskikh ritmov kak rezul'tat konflikta nesovmestimykh pobuzhdenii).** V. A. Zotov and V. A. Nepomniashchikh (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, July-Aug. 1981, p. 622-627. 5 refs. In Russian.

The organization of the groups of oscillators believed to control the rhythmic activities of an organism is investigated in studies of the consequences of the superposition of incompatible stimuli. The characteristics of foreleg cleaning behavior in the mite Varroa jacobsoni and of the circadian motility cycle in the beetle Trigonoscelis gigas were observed under stressful conditions: isolation from the host in the first case and constant temperature and illumination in the second. The experiments have shown the behavioral acts consisting of the cleaning of the right and left limbs in mites and burrowing into the soil and emerging from it in beetles to be under the control of separate oscillators, as they are characterized by different periodicities. As the phases of the rhythms controlled by these oscillators begin to overlap, conflict behavior is observed, and arrhythmias and other disturbances of the rhythm appear. A.L.W.

**A82-21721** † **Characteristics and patterns of the individual development of male and female rats in the light of the energy rule of skeletal muscles (Osobennosti i zakonomernosti individual'nogo razvitiia samtsov i samok krys v svete energeticheskogo pravila skeletnykh myshts).** I. A. Arshavskii, V. D. Rozanova, and T. G. Savkiv (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Sept.-Oct. 1981, p. 698-707. 21 refs. In Russian.

**A82-21722** † **Introduction prognosis and its methodological aspects (Introduktsionnyi prognoz i ego metodicheskie aspekty).** S. E. Korovin and A. S. Demidov (Akademiia Nauk SSSR, Glavnyi Botanicheskii Sad, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Sept.-Oct. 1981, p. 673-679. 17 refs. In Russian.

The present status, together with the prospects for development of introduction prognosis is considered. Factual material is presented showing the possibility of predicting the reactions of subtropical plants to the conditions under which they are introduced. The predictions are based on a method of ecological and geographical comparisons. C.R.

**A82-21723** † **Absence of the additive effect in the combined irradiation of Crepis capillaris seeds and seedlings by gamma rays and neutrons (Otsutstvie additivnogo effekta pri kombinirovannom obluchenii semian i prorostkov Crepis capillaris gamma-luchami i neitronami).** E. V. Fesenko and N. V. Luchnik (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 630-632. 11 refs. In Russian.

**A82-21724** † **Some indicators of protein metabolism in erythrocytes during radiation sickness and following cystamine injection (Nekotorye pokazateli belkovogo obmena v eritrotsitakh pri luchevoi bolezni i vvedenii tsistamina).** I. A. Serebrennikova and N. I. Kolesova (Tomskii Meditsinskii Institut, Tomsk, USSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 577-581. 17 refs. In Russian.

The effects of high-energy betatron irradiation and the preliminary injection of cystamine on erythrocyte protein metabolism are investigated. Determinations of total, amine, urea and residual nitrogen, free amino acid, and proteolytic enzyme activities were made in rabbits before and up to 30 days after exposure to 10 gram-roentgens of 25-MeV betatron radiation. Ionizing radiation is found to lead to the activation of erythrocyte proteolytic enzymes, resulting in the breakdown of endogenous proteins and an increase in the nitrogenous products of protein metabolism. The preliminary intravenous injection of cystamine reduces the deleterious effects of radiation on protein metabolism, and increases the survival rate after 30 days from 67 to 82%. A.L.W.

**A82-21725** † **Characteristics of the relations of the primary responses of the pentose phosphate pathway to glycolysis in the bone marrow of irradiated rats (Osobennosti vzaimosviazi vazhneishikh reaktsii pentozofosfatnogo puti s glikolizom v kostnom mozge obluchennykh krys).** I. V. Savitskii and V. K. Napkhaniuk (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 596-602. 12 refs. In Russian.

**A82-21726** † **Changes in morphological and cytogenetic hemopoietic indicators in hamadryas baboons exposed to chronic low-level radiation (Izmeneniia morfologicheskikh i tsitogeneticheskikh pokazatelei krovetvornoi sistemy u pavianov gamadrilov pri khronicheskom obluchenii v malykh dozakh).** E. K. Dzhikidze, M. I. Kuskova, and L. P. Kosichenko (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Radiobiologiia,* vol. 21, Sept.-Oct. 1981, p. 706-711. 9 refs. In Russian.

**A82-21727** † **Auditory depth perception - Localization of nonmoving and moving sound sources (Prostranstvennyi slukh - Lokalizatsiia nepodvizhnykh i dvizhushchikhsia istochnikov zvuka).** Ia. A. Al'tman (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 28-51. 76 refs. In Russian.

The literature on the localization of nonmoving and moving sound sources is surveyed in an effort to study the basic characteristics of the depth perception of moving sources. It is shown that there is a critical time interval for the formation of the perception of moving sources. The differential sensitivity of the auditory system for the perception of moving sources is higher than for the localization of nonmoving sources. The neurophysiological aspects of the spatial localization of moving sound sources are examined with particular attention given to the role of central auditory neurons. B.J.

**A82-21728** † **Pulmonary shunting and its regulation (Legochnyi shunt i ego reguliatsiia).** L. G. Dukov (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 112-128. 104 refs. In Russian.

On the basis of studies of ventilation-perfusion relationships, recent data on the mechanisms governing the development and regulation of pulmonary shunting are presented. The ability of existing techniques to measure and separate the shunting is discussed in detail. It is found that in healthy subjects shunting derives from two causes. The first is an anatomic shunting, that is, the discharge of venous blood through bronchial veins into the pulmonary veins and along the thebesian channels into the left heart. The second is a ventilation-perfusion irregularity, that is, the perfusion of hypoventilated alveoli. Attention is also given to the mechanisms controlling pulmonary shunting, namely collateral ventilation, pulmonary hypoxic vasoconstriction, and bronchoconstriction from hypocapnia. C.R.

**A82-21729** † **A systems analysis of human motor reactions in various modes of operation of goal-directed behavioral acts (Sistemnyi analiz dvigatel'nykh reaktsii cheloveka v raznykh rezhimakh raboty tselenapravlennogo povedencheskogo akta).** O. Ia. Bokser (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and K. V. Sudakov (Ivanovskii Meditsinskii Institut, Ivanovo, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Jan.-Mar. 1981, p. 3-31. 125 refs. In Russian.

The way in which goal-directed activity in humans is ensured somatically and autonomically on the basis of a temporal organization of start and stop signals is investigated. Laws are established for the programming of the results of the working of the space-time continuum of stage results and effector components directed toward the attainment of a finite adaptive effect that is characteristic of each type of behavioral act investigated. C.R.

**A82-21730** † **The dynamics of forming a prediction system in goal-directed behavior (Dinamika formirovaniia apparata prognozirovaniia v tselenapravlennom povedenii).** G. N. Rychkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 99-111. 37 refs. In Russian.

A hypothesis describing a dynamic principle at work in the formation of a system for prediction is elaborated. The stage of generalization involves the setting up of an inexact and redundant reinforcement model in the acceptor for evaluating the results of actions; here, ineffective methods of attaining goals prevail. In the stage of concentration, a precise reinforcement model is set up, and there are effective means of attaining goals. The system for prediction evolves by means of a mechanism of orienting and exploratory reactions; these arise from discrepancies between the predicted and the actual. The evolution also depends on a system of positive and negative emotions that operates simultaneously. C.R.

**A82-21731** † **Study of the electrical activity of the extraocular muscles (Issledovanie elektricheskoi aktivnosti vneshnikh glaznykh myshts).** R. B. Nebieridze (Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 12, Jan.-Mar. 1981, p. 119-132. 84 refs. In Russian.

The characteristics of the electrical activity associated with the extraocular muscles in tonus and during tracking and saccadic eye movements are discussed on the basis of experimental and literature data. Electromyographic studies of the motor units of the ocular muscles are considered, and morphological and physiological evidence for the existence of two types of motor units, tonic and phasic, in the extraocular muscles is reviewed. On the basis of this evidence, it is proposed that rather than there being units functioning either to maintain tonus or induce movements, there exists one type of motor unit functioning at rest and during the fast and slow phases of nystagmus, and a second type functioning only during the fast phase of nystagmus, primarily during large-amplitude saccades. The characteristics of motorneuron control of tracking and saccadic eye movements are also discussed. A.L.W.

**A82-21732** † **The effect of cold stress on the level and activity of microsomal cytochrome P-450 in the rat liver (Vliianie kholodovogo stressa na soderzhanie i aktivnost' mikrosomal'nogo tsitokhroma P-450 pecheni krys).** L. I. Deev, M. Ia. Akhalaia, and Iu. B. Kudriashov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Aug. 1981, p. 28-30. 15 refs. In Russian.

**A82-21733** † **The correlation between hematologic and biochemical indicators in the turtles Testudo horsfieldi (Korreliatsionnye sviazi mezhdu gematologicheskimi i biokhimicheskimi pokazateliami u cherepakh Testudo horsfieldi).** L. A. Tiunov, V. A. Ivanova, A. I. Kliorin, A. A. Turdyev, and V. P. Timofeev. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, July 1981, p. 47-49. 12 refs. In Russian.

Experiments are described showing that the blood, even though having a low level of erythrocytes, has a high content of hemoglobin. This is interpreted to mean that the low number of erythrocytes is balanced by a high degree of hemoglobin saturation. The concentration of leukocytes in the blood is found to be relatively high. C.R.

**A82-21734** † **Activation of succinate dehydrogenation in rat liver by noradrenalin, cAMP and acute cooling (Aktivatsiia degidrirovaniia suktsinata v pecheni krys pod vliianiem noradrenalina, tsAMF i ostrogo okhlazhdeniia).** V. I. Kulinskii, A. K. Kuntsevich, and L. V. Trufanova (Krasnoiarskii Meditsinskii Institut, Krasnoyarsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Aug. 1981, p. 33, 34. 15 refs. In Russian.

**A82-21735** † **The effect of low temperature on the activity and substrate specificity of monoamine oxidases in rat brain mitochondria (Vliianie nizkoi temperatury na aktivnost' i substratnuiu spetsifichnost' monoaminoksidaz v mitokhondrial'noi fraktsii mozga krys).** I. A. Goroshinskaia, A. A. Krichevskaia, and Z. G. Bronovitskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Apr. 1981, p. 431-433. 14 refs. In Russian.

**A82-21736** † **Peroxidation of lipids in the liver and lungs of rats during prolonged adaptation to the cold (Reaktsii perekisnogo okisleniia lipidov v pecheni i legkikh krys pri dolgovremennoi adaptatsii k kholodu).** N. G. Kolosova, Iu. P. Shorin, and V. Iu. Kulikov (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Apr. 1981, p. 436, 437. 10 refs. In Russian.

**A82-21737** † **Effect of low-temperature on the membrane permeability of erythrocytes reconstituted in media of different ionic composition (Vliianie nizkotemperaturnogo vozdeistviia na pronitsaemost' membran eritrotsitov, rekonstruirovannykh v sredakh razlichnogo ionnogo sostava).** A. K. Gulevskii (Akademiia Nauk Ukrainskoi SSR, Institut Problem Kriobiologii i Kriomeditsiny, Kharkov, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, May 1981, p. 551-553. 9 refs. In Russian.

**A82-21738** † **The effect of blood pressure in the pulmonary artery on gas exchange in functionally heterogeneous lungs (Vliianie davleniia krovi v legochnoi arterii na gazoobmen v funktsional'no neodnorodnykh legkikh).** A. I. D'iachenko (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, May 1981, p. 564-566. 6 refs. In Russian.

The blood pressure in the common pulmonary artery in humans is determined on the basis of measurements of the alveolar-arterial difference in oxygen pressures and the arterial-alveolar difference in carbon dioxide pressures. The study is carried out for a variety of gas compositions of mixed venous blood and at different levels of lung ventilation. A mathematical model for the operation of heterogeneous lungs is used. The model consists of three parts, describing blood flow, ventilation, and gas exchange in individual lobules; it also includes equations of the gas composition average of arterial blood and alveolar air. C.R.

**A82-21739** † **Change in the nature of the psychotropic effect on the emotional reactivity and behavior in stress situations depending on the state of the catecholaminergic systems of the brain (Izmenenie kharaktera psikhotropnogo effekta na emotsional'nuiu reaktivnost' i povedenie v stress-situatsii v zavisimosti ot sostoianiia katekholaminergicheskikh sistem mozga).** N. A. Bondarenko, A. V. Validman, and V. A. Kamysheva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, July 1981, p. 35-38. 15 refs. In Russian.

**A82-21740** † **Effect of cooling of the rhythmo-inotropic ratio in a pathologically altered myocardium (Vliianie okhlazhdeniia na ritmo-inotropnye otnosheniia v patologicheski izmenennom miokarde).** E. G. Vornovitskii, V. B. Ignat'eva, A. N. Kaidash, A. D. Arapov, and E. B. Mogilevskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, July 1981, p. 10-14. 12 refs. In Russian.

**A82-21741** † **The effect of synaptically active drugs on the hyperthermic effect of prostaglandin E2 in rats (Vliianie sinapticheski aktivnykh veshchestv na gipertermicheskii effekt prostaglandina E2 u krys).** V. N. Gurin, F. E. Vismont, and V. V. Tsariuk (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Mar. 1981, p. 304, 306. 14 refs. In Russian.

**A82-21742** † **An investigation of the biological activity of chalones separated from normal livers and from livers that are being regenerated (Izuchenie biologicheskoi aktivnosti keilonov, vydelennykh iz normal'noi i regeneriruiushchei pecheni).** S. A. Ketlinskii and E. V. Parfenova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, July 1981, p. 96-98. 6 refs. In Russian.

**A82-21743** † **The circadian rhythm of activity of adrenergic nerve fibers in the dura mater of rats (Sutochnyi ritm aktivnosti adrenergicheskikh nervnykh volokon tverdoi mozgovoi obolochki krys).** V. S. Karedina (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Oct. 1981, p. 485, 486. 5 refs. In Russian.

**A82-21744** † **A histochemical investigation of the microvascular effectors regulating the supply of blood to the cerebral cortex (Gistokhimicheskie issledovaniia mikrovaskuliarnykh effektorov regulirovaniia krovosnabzheniia kory golovnogo mozga).** D. G. Baramidze, R. Gadamskii, and G. Szumanska (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR; Polish Academy of Sciences, Experimental and Clinical Medicine Centre, Warsaw, Poland). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Feb. 1981, p. 228-231. 9 refs. In Russian.

**A82-21745** † **A three-dimensional model for the arrangement of the vascular and tubular components of the renal osmoregulatory apparatus (Ob'emnaia model' zakladki sosudistogo i kanal'tsevogo komponentov osmoreguliruiushchego apparata pochki).** V. I. Proniaev (Chernovitskii Meditsinskii Institut, Chernovtsy, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Aug. 1981, p. 114-116. 13 refs. In Russian.

**A82-21746** † **Activation of the metabolism of the gamma-aminobutyric acid system in the cerebral hemispheres under various types of stress (Aktivatsiia metabolizma GAMK-sistemy v polushariiakh golovnogo mozga pri deistvii razlichnykh stressornykh faktorov).** F. Z. Meerson, V. I. Pavlova, V. S. Iakushev, and S. P. Sinitsyn (Akademiia Meditsinskikh Nauk SSSR, Moscow; Cheliabinskii Pedagogicheskii Institut; Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Jan. 1981, p. 23, 24. 10 refs. In Russian.

The activation of the gamma-aminobutyric acid system's metabolism is thought to occur through a nonspecific mechanism which responds to a variety of extreme irritants. By limiting the stress syndrome, the mechanism prevents harmful effects. To test this hypothesis, the main parameters of the gamma-aminobutyric acid system are compared in four groups of animals. It is found that activation can be brought about by an extremely wide range of irritants. C.R.

**A82-21747** † **Noise and vibration effects on vestibular and visual functions in teenagers (Shumovibratsionnye vozdeistviia na vestibuliarno-zritel'nye funktsii u podrostkov).** Ts. Popivanova (Meditsinska Akademiia, Sofia, Bulgaria). *Gigiena i Sanitariia*, Sept. 1981, p. 58, 59. In Russian.

The purpose is to assess the effects of noise and vibration on the activity of the vestibular and visual analyzers of teenagers receiving training in the textile and machine-building industries. Special attention is given to the vestibular effect on the visual system when the vestibular analyzer is in a noninertial state. It is found that these teenagers are more susceptible, in terms of both frequency and severity, to impaired spatial perception. These disorders are found to be independent of the amount of attention paid to the task at hand. C.R.

**A82-21748** † **Complex physiological-hygienic characteristics of a new work-rest regime for seamen (K kompleksnoi fiziologo-gigienicheskoi kharakteristike novogo rezhima truda i otdykha plavsostava).** Iu. M. Stan'ko, D. S. Slutsker, L. M. Shafran, and V. N. Evstaf'ev (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Gigiena i Sanitariia*, Jan. 1981, p. 27-29. In Russian.

**A82-21749** † **Physiological-hygienic substantiation of admissible noise level in school rooms in a hot climate (Fiziologo-gigienicheskoe obosnovanie dopustimogo urovnia shuma v uchebnykh pomeshcheniiakh shkol i vuzov v usloviiakh zharkogo klimata).** M. P. Magai (Uzbekskii Nauchno-Issledovatel'skii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent, Uzbek SSR) and I. L. Karagodina (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena i Sanitariia*, Mar. 1981, p. 26-28. 12 refs. In Russian.

**A82-21750** † **Summary of a discussion on the problem of the 'biological norm' /in relation to an assessment of criteria of the harmfulness of chemical effects/ (Itogi diskussii po probleme 'biologicheskaia norma' /k otsenke kriteriev vrednosti khimicheskikh vozdeistvii/).** I. M. Trakhtenberg and M. N. Korshun (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Gigiena i Sanitariia*, May 1981, p. 49-52. 21 refs. In Russian.

The concept of the biological norm is discussed in relation to criteria of harmfulness in hygiene and toxicology. Ways of determining this norm are considered, and particular attention is given to the development of quantitative and qualitative criteria of the harmfulness of chemical (and other pollution-related) effects on the organism. B.J.

**A82-21751** † **The effects of successive ionizing radiation and heat on antibody formation (Posledovatel'noe deistvie ioniziruiushchei radiatsii i tepla na protsess antiteloobrazovaniia).** I. A. Gamzaeva, N. S. Gabai, R. F. Iagubov, and D. Kh. Aivazova (Ministerstvo Zdravookhraneniia Azerbaidzhanskoi SSR, Respublikanskii Nauchno-Issledovatel'skii Institut Virusologii, Mikrobiologii i Gigieny, Baku, Azerbaidzhan SSR). *Gigiena i Sanitariia*, Jan. 1981, p. 35, 36. 8 refs. In Russian.

The responses of antibody formation processes to prolonged successive exposures to low doses of ionizing radiation and hyperthermia are investigated. Rats were exposed to a constant Co-60 gamma-ray source at dose rates of 0.0000305 to 0.0000292 A/kg for 7 hours daily, temperatures of 40 C for 4 hours daily or radiation followed by heat for the course of 1 month, following which the numbers of antibody forming cells in the spleen were determined by the method of Ierne and Nordin (1963). Prolonged exposure to radiation is found to lead to an 18.3% reduction in the number of antibody-forming cells, while hyperthermia has little influence on antibody production in unirradiated animals. Successive exposure to both radiation and heat is observed to result in an even more pronounced suppression of antibody-forming cell production in the spleen. A.L.W.

**A82-21752** † **The effects of elevated environmental temperature combined with radiation on the organism (Deistvie povyshennoi temperatury okruzhaiushchei sredy v sochetanii s radiatsionnym faktorom na organizm).** M. M. Tsapkov. *Gigiena i Sanitariia*, Jan. 1981, p. 50-53. 24 refs. In Russian.

Literature data concerning the combined effects of ionizing radiation and elevated temperatures on the physiological functions of laboratory animals is reviewed. The data demonstrate effects of combined exposures on the cardiovascular system, impairments in the enzymatic activity of various tissues and the inactivation of chromosomal repair processes following radiation damage. The degree of radiation damage depends both on the radiation dose and the duration of the temperature factor, although elevated temperatures accelerate the elimination of radioactive substance from the body. A need for further experimental data for the evaluation of human working conditions and radiation safety is expressed. A.L.W.

**A82-21753** † **Echoencephalographic indices in patients with hypertensive disease under the effect of functional loads (Ekhoentsefalograficheskie pokazateli u bol'nykh gipertonicheskoi bolezn'iu pod vliianiem funktsional'nykh nagruzok).** Iu. S. Gaiduk (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, June 1981, p. 56-58. 8 refs. In Russian.

**A82-21754** † **Phasic energy analysis of rheoencephalograms in the detection of the decompensation of cerebral hemodynamics (Fazovo-energeticheskii analiz reoentsefalogramm pri raspoznavanii dekompensatsii tserebral'noi gemodinamiki).** O. N. Keller (Zaporozhskaia Oblastnaia Klinicheskaia Bol'nitsa, Zaporozhe, Ukrainian SSR) and I. Ia. Eingorn (Proizvodstvennoe Ob'edinenie Zaporozhtransformator, Zaporozhe, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1981, p. 99-102. 5 refs. In Russian.

**A82-21755** † **Clinical results on thymectomy in patients with myopathy in relation to the degree of muscular weakness (Klinicheskie rezul'taty timektomii u bol'nykh miopatiei v zavisimosti ot stepeni myshechnoi slabosti).** T. A. Vaiikova (Tomskii Meditsinskii Institut, Tomsk, USSR). *Vrachebnoe Delo*, May 1981, p. 89-92. 6 refs. In Russian.

**A82-21756** † **Mechanisms of compensation and adaptation in relation to the hyperfunction of the heart (Mekhanizmy kompensatsii i adaptatsii pri giperfunktsii serdtsa).** V. N. Dziak and S. F. Valevskii (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1981, p. 88-92. 9 refs. In Russian.

Results of a study of 167 patients with ischemic heart disease are presented. It is found that, under conditions of urgent adaptation to physical stress, a process of latent decomposition occurs during the early preclinical stage of cardiac insufficiency. This stage is characterized by a reduction of the diastolic relaxation rate of the heart, a reduction of ejection fractions, stroke volume, and oxygen pulse, and an increase in terminal diastolic and systolic volume. B.J.

**A82-21757** † **The effect of physical training on the lipid and lipoprotein metabolism in people of various ages (Vliianie fizicheskoi trenirovki na obmen lipidov i lipoproteidov u liudei raznogo vozrasta).** S. V. Gogush, P. P. Chaialo, T. A. Kirienko, L. V. Riabokon' (Kievskii Nauchno-Issledovatel'skii Institut Meditsinskikh Problem Fizicheskoi Kul'tury, Kiev, Ukrainian SSR; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and V. P. Perfilov. *Vrachebnoe Delo*, Sept. 1981, p. 51-53. 9 refs. In Russian.

**A82-21758** † **Metabolic change in test animals as an indicator of the biological effect of an electromagnetic field having a frequency of 50 Hz (Izmenenie metabolizma v organizme podopytnykh zhivotnykh kak odin iz pokazatelei biologicheskogo deistviia EMP chastotoi 50 GTs).** L. A. Tomashevskaia and Iu. D. Dumanskii (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* July 1981, p. 98-100. In Russian.

**A82-21759** † **Certain features of cerebral hemodynamics in doing mental work at different air temperatures (Nekotorye osobennosti tserebral'noi gemodinamiki pri vypolnenii umstvennoi raboty v usloviiakh razlichnykh temperatur vozdukha).** A. A. Lashchuk (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Aug. 1981, p. 102-104. 8 refs. In Russian.

**A82-21760** † **The physical activity of humans as a social and biological problem (Fenomen fizicheskoi aktivnosti cheloveka kak sotsial'no-biologicheskaia problema).** V. K. Bal'sevich. *Voprosy Filosofii,* no. 8, 1981, p. 78-89. 18 refs. In Russian.

**A82-21761** † **Changes in the structure and cellular composition of the inguinal lymph nodes of white rats subjected to static and dynamic stresses (Izmenenie struktury i kletochnogo sostava pakhovykh limfaticheskikh uzlov belykh krys pod vliianiem dinamicheskoi i staticheskoi nagruzok).** T. I. Bikhruk (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, May 1981, p. 23-28. 7 refs. In Russian.

**A82-21762** † **Decussations in the human muscular system (Perekresty v myshechnoi sisteme cheloveka).** P. M. Petrova and G. D. Keis (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Apr. 1981, p. 32-38. 11 refs. In Russian.

A classification is presented which divides decussations of the human muscular system into three groups: (1) decussations of muscles situated in neighboring layers of the same topographic area; (2) decussations of muscle-synergists; and (3) decussations of fibers of one muscle as well as of tendons of one muscle. It is proposed that decussation in a particular muscle group always presupposes decussation in the antagonistic group. The conformity of decussations in antagonistic groups of muscles is morphological evidence of their functional unity. B.J.

**A82-21763** † **Dynamics of the condition of granulation tissue after injuries sustained at different times of the day (Dinamika sostoianiia granuliatsionnoi tkani posle travmy, nanesennoi v raznoe vremia sutok).** Kh. M. A. Marrades and L. P. Sapozhnikova (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Oct. 1981, p. 47-51. 27 refs. In Russian.

**A82-21764** † **An electron microscope study of hyperplasia in fibers of the skeletal muscles of athletes (Elektronnomikroskopicheskoe issledovanie proiavlenii giperplazii myshechnykh volokon skeletnykh myshts sportsmenov).** V. F. Kondalenko, Iu. P. Sergeev, and V. V. Ivanitskaia (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, June 1981, p. 66-70. 15 refs. In Russian.

**A82-21765** † **The morphology of the lungs of dogs whose movement is completely restricted (Morfologiia legkikh sobak pri kruglosutochnom ogranichenii podvizhnosti).** M. K. Karimov (Tadzhikskii Gosudarstvennyi Meditsinskii Institut, Dyushanbe, Tadzhik SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 82-88. 9 refs. In Russian.

Various histological and morphometric methods were used to study vascular and tissue structures in the lungs of 49 dogs whose movement was completely restricted for 1, 3, 7, 15, 30, 60, and 90 days. In nearly every period of the experiment, edema was found in the bronchial wall, perivsal and peribronchial tissue, and interalveolar septa. As the time of hypokinesia increases, the connective tissue becomes coarse and the collagenous fiber fasciculi become thicker along the vascular bed. All the components are subject to morphological alterations due to hypokinesia, which in turn affects the gas-exchange function. B.J.

**A82-21766** † **Age morphofunctional characteristics of chromaffin tissue in the celiac nodes, both in the norm and with hypokinesia (Vozrastnaia morfofunktsional'naia kharakteristika khromaffinnoi tkani chrevnykh uzlov v norme i pri gipokinezii).** S. A. Kakabadze (Severo-Osetinskii Meditsinskii Institut, Ordzhonikidze, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 57-64. 14 refs. In Russian.

**A82-21767** † **Features of the reaction to noise of the spinal capillaries of white rats (Osobennosti reaktsii krovenosnykh kapilliarov spinnogo mozga beloi krysy pri vozdeistvii shuma).** G. A. Ivanenko (Khabarovskii Gosudarstvennyi Meditsinskii Institut, Khabarovsk, Ukrainian SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, July 1981, p. 54-58. 5 refs. In Russian.

**A82-21768** † **The source of reparative regeneration in skeletal muscle tissue (Ob istochnike reparativnoi regeneratsii skeletnomyshechnoi tkani).** A. A. Klishov and V. N. Vinogradova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 72-77. 16 refs. In Russian.

Experiments were performed on 30 white rats to investigate the source of reparative regeneration in skeletal muscle tissue. Anterior tibial muscle was cut open and studied using light and electron microscopy. The source of regeneration was found to be type I satellite cells which are transformed into type II satellite cells and, further, into myoblasts. These myoblasts are able to divide mytotically and fuse with each other, forming myosymplasts. B.J.

**A82-21769** † **Neuronal-glial alterations in the cerebral cortex of animals under the influence of white noise (Neirono-glial'nye izmeneniia v kore bol'shogo mozga zhivotnykh pri vozdeistvii belogo shuma).** N. I. Artiukhina, K. K. Hecht, I. P. Levshina, and O. F. Kubaeva (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR; Berlin, Humboldt-Universität, Berlin, East Germany). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Sept. 1981, p. 27-33. 20 refs. In Russian.

**A82-21770** † **Lysosomes under conditions of stress (Lizosomy v usloviiakh stressa).** N. N. Mal[illegible] and L. E. Panin (Akademiia Meditsinskikh Nauk SSSR, Nov[illegible]birsk, USSR). *Uspekhi Sovremennoi Biologii,* vol. 92, July-Aug. 1981, p. 64-80. 151 refs. In Russian.

Changes in the characteristics of lysosomes under conditions of stress are reviewed in relation to the role of lysosomes in stress adaptation. Experimental data demonstrating changes in lysosome enzyme activities, membrane permeability, numbers, sizes and cellular locations upon organism exposure to stress factors including cooling, physical exercise, hypoxia, ionizing radiation, hyperbaric oxygenation, nutritional insufficiencies and altitude hypoxia training is presented, and the hormonal regulation of lysosomal functions under stressful conditions is discussed. The role of the lysosome in adaptive responses to subextremal and extremal environmental factors is then considered in the areas of metabolic adjustment, the provision of cells with energy and material substrates, intracellular regeneration, proliferative processes and stromal-parenchymal interactions. A.L.W.

**A82-21771** † **The state of the vegetative functions during sleep (Sostoianie vegetativnykh funktsii vo vremia sna).** N. A. Vlasov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Uspekhi Sovre-*

*mennoi Biologii*, vol. 92, July-Aug. 1981, p. 127-138. 198 refs. In Russian.

Recent studies on vegetative functions and the dynamics of their changes during various stages of night sleep are reviewed. Particular attention is given to the vegetative regulation during sleep of the cardiovascular, respiratory, and gastrointestinal systems, brain and skin temperature, electrodermal resistance, and the cutaneogalvanic reflex. B.J.

**A82-21772** † **Nucleic acid and protein metabolism in cardiac muscle (Metabolizm nukleinovykh kislot i belkov v serdechnoi myshtse).** M. P. Iavich (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Sovremennoi Biologii*, vol. 91, May-June 1981, p. 334-349. 141 refs. In Russian.

**A82-21773** † **Cellular and molecular bases of local immunity (Kletochnye i molekuliarnye osnovy mestnogo immuniteta).** A. E. Vershigora and V. V. Ovod (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Uspekhi Sovremennoi Biologii*, vol. 91, May-June 1981, p. 393-408. 163 refs. In Russian.

Experimental investigations of the last five years concerned with the mechanisms of cellular and humoral immunity are reviewed with particular emphasis on the local immunity of the mucous membranes. The origin, antigen induction and migration pathways of the cells synthesizing class A immunoglobulins (IgA) are examined. Mechanisms controlling the relative populations of the plasmacytes synthesizing IgA in the lymphoid formations associated with the mucous membranes and exocrine glands and the differentiation of cells producing IgA dimers are discussed. Attention is also given to results of studies of the integration of separate polypeptides, the physical and chemical properties of secretory molecules IgA, and mechanisms of IgA dimer transport through the granular epithelium. A.L.W.

**A82-21774** † **Mechanisms for the regulation of the intracellular calcium distribution (Mekhanizmy reguliatsii vnutrikletochnogo raspredeleniia kal'tsiia).** S. N. Orlov (Ministerstvo Zdravookhraneniia SSR, IV Glavnoe Upravlenie - Tsentral'naia Nauchno-Issledovatel'skaia Laboratoriia, Moscow, USSR). *Uspekhi Sovremennoi Biologii*, vol. 92, July-Aug. 1981, p. 19-34. 151 refs. In Russian.

Mechanisms involved in the hormonal and ionic regulation of cellular calcium levels and calcium binding by the various cellular membranes are reviewed. Consideration is given to the regulation of the calcium intake through changes in the potential-dependent and potential-independent membrane channels and the channels controlling sodium intake, and of calcium outflow through Ca-Na exchange and Ca-ATPase which serve to maintain cellular calcium levels an order of magnitude lower than those of the extracellular fluid. Also examined are the kinetics of calcium bonding to the interior plasma membrance, mitochondria and the endoplasmic reticulum. A.L.W.

**A82-21775** † **The application of bicycle ergometry to the early detection of ischemic heart disease (O primenenii veloergometrii dlia rannego vyiavleniia ishemicheskoi bolezni serdtsa).** V. Ia. Grigorov, E. G. Tarasik, and L. V. Mel'nikova. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 56, 57. In Russian.

A clinical study on the application of exercise cardiography to the detection of latent ischemic heart disease in apparently healthy persons is presented. The study involved the measurement of three- and six-channel EKGs in 400 subjects undergoing submaximal bicycle ergometer exercise. Indicators of coronary insufficiency were found in 17.8% of persons considered to be practically healthy, 66.2% of persons considered to be at high risk for ischemic heart disease, 56.4% of persons with unusual resting EKGs characteristics of ischemia and 46.1% of persons with cardialgia. Results thus demonstrate the usefulness of exercise cardiography in clinical situations for the detection of latent ischemic heart disease in otherwise healthy persons or persons at high risk undergoing close medical surveillance. A.L.W.

**A82-21776** † **Effects of pyrroxane and methylapogalantamine on cerebral blood circulation and oxygen regime (Vliianie pirroksana i metilapogalantamina na krovoobrashchenie i kislorodnyi rezhim golovnogo mozga).** V. E. Pogorelyi (Piatigorskii Farmatsevticheskii Institut, Pyatigorsk, USSR). *Farmakologiia i Toksikologiia*, vol. 44, Mar.-Apr. 1981, p.167-170. 14 refs. In Russian.

**A82-21777** † **The effect of piracetam on the body's resistance to hypoxia (Vliianie piratsetama na ustoichivost' organizma k gipoksii).** L. F. Roshchina (Vsesoiuznyi Nauchno-Issledovatel'skii Khimiko-Farmatsevticheskii Institut, Moscow, USSR) and R. U. Ostrovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia*, vol. 44, Mar.-Apr. 1981, p. 210-213. 16 refs. In Russian.

Experiments show that piracetam increases the resistance of animals to various types of hypoxia: hypoxic in mice and cats, circulatory in rats, and histotoxic in cats. But the drug does not exert protective action in cats, rats, and mice with hemic hypoxia induced by the injection of sodium nitrite. B.J.

**A82-21778** † **Effects of dioxaline and oxamide on succinate and lactate dehydrogenase activities in rat liver, kidney and brain tissues and on the chromosomal apparatus of bone marrow cells (Vliianie dioksalina i oksamida na aktivnost' suktsinat- i laktatdegidrogenazy v tkaniakh pecheni, pochek, golovnogo mozga i na khromosomnyi apparat kletok kostnogo mozga krys).** I. P. Fomochkin, A. I. Faketov, G. T. Pis'ko, I. R. Bariliak, N. P. Barsukov, V. I. Bondarenko, G. F. Gusev, V. B. Levandovskii, T. G. Prokopenko, and V. V. Sristov (Krymskii Meditsinskii Institut, Simferopol, Ukrainian SSR). *Farmakologiia i Toksikologiia*, vol. 44, Mar.-Apr. 1981, p. 611-616. 9 refs. In Russian.

**A82-21779** † **The effect of the prolonged administration of sodium hydroxybutyrate on the physical work capacity and muscle tissue state of rats (Vliianie natriia oksibutirata pri prodolzhitel'nom vvedenii na fizicheskuiu rabotosposobnost' i sostoianie myshechnoi tkani u krys).** R. U. Ostrovskaia, N. N. Kleimenova, and V. A. Arefolov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia*, vol. 44, Sept.-Oct. 1981, p. 534-539. 13 refs. In Russian.

Experiments on albino rats involving the administration of sodium hydroxybutyrate for a two-month period (100 and 1000 mg/kg daily) are described. It is found that such administration increased the work capacity and body weight of the rats and produced marked changes in the mitochondrial apparatus of cardiac myocytes and skeletal muscles. Prolonged administration of the drug resulted in an increased amount of mitochondria, polyploidy of cardiomyocyte nuclei (for a dose of 100 mg/kg) and marked hypertrophy (for a dose of 1000 mg/kg). It is suggested that this drug has a specific anabolic effect based on hormonal control and an effect on protein synthesis. B.J.

**A82-21780** † **Adaptogenic effect of mebicar during emotional stress, exercise, and hypoxia (Adaptogennyi effekt mebikara pri emotsional'nom napriazhenii, fizicheskoi nagruzke i gipoksii).** M. M. Kozlovskaia, R. U. Ostrovskaia, N. N. Kleimenova, V. A. Kamysheva, and S. N. Sudareva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia*, vol. 44, Nov.-Dec. 1981, p. 654-657. 13 refs. In Russian.

Experiments on cats, mice, and rats disclosed the adaptogenic effect of mebicar. The drug decreased emotional stress and removed the stupor-like state in cats induced by stress and pain stimulation. The drug slightly increased the life span of animals under hypoxic hypoxia and raised the limits of maximum tolerable physical load. It reduced the accumulation of hypoxic lactate, and produced an increase in glycogen content in muscle cells of the myocardium and skeletal muscles. B.J.

**A82-21781** † **The effect of cholinomimetics on the development of hypothermia (Vliianie kholinomimetikov na skorost' razvitiia gipotermii).** N. O. Bazhenov and V. N. Saliaev (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR). *Farmakologiia i Toksikologiia*, vol. 44, Jan.-Feb. 1981, p. 40-43. 8 refs. In Russian.

Experiments were performed on 120 male rats to study the rate of hypothermia development in different stages: mild, medium, and deep, corresponding to rectal temperatures of 33, 26, and 19 C. This rate decreased significantly in mild hypothermia induced by nicotine (4 mg/kg), in medium hypothermia induced by nicotine and pilocarpine (25 mg/kg), and methacine (20 mg/kg) combined with arecoline (20 mg/kg), and in deep hypothermia induced by methacine combined with arecoline. However, the rate of development was found to rise in deep hypothermia induced by methacine (20 mg/kg) combined with proserine (0.45 mg/kg). B.J.

**A82-21782** † **The ultrastructure of the liver sinusoids of mice under conditions of acute stress - Morphometric study (Ul'trastruktura sinusoidov pecheni myshei v usloviiakh ostrogo stressa - Morfometricheskoe issledovanie).** V. A. Shkurupii (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Tsitologiia i Genetika,* vol. 15, May-June 1981, p. 3-8. 8 refs. In Russian.

An analysis is presented of structural changes in the endothelial and Kupffer liver cells of male mice after acute physical stress. It is found that these changes are evidence of the intensification of endocytose processes and the inhibition of protein synthesis. B.J.

**A82-21783** † **The existence of an endogenous biorhythm in chromatin-positive cells of the buccal epithelium in women (O sushchestvovanii endogennogo bioritma khromatinpolozhitel'nykh kletok bukkal'nogo epiteliia zhenshchin).** T. A. Zaletaeva and Iu. E. Ershikova (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Tsitologiia i Genetika,* vol. 15, July-Aug. 1981, p. 7-9. 14 refs. In Russian.

**A82-21784** † **EEG evaluation of mental stress (K EEG-otsenke umstvennogo napriazheniia).** I. M. Volkova and S. I. Gorshkov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Sept.-Oct. 1981, p. 1071-1075. 7 refs. In Russian.

The paper reviews several EEG studies of mental stress and mental work capacity involving visual search. The search performance was studied as a function of the duration of the preparation period, and the electrophysiological correlates of this search activity were investigated along with its efficiency, the state of preparedness, and the associated intercentral relations. B.J.

**A82-21785** † **The effects of emotional activation on the spatial synchronization of human brain biopotentials (Vliianie emotsional'noi aktivatsii na prostranstvennuiu sinkhronizatsiiu biopotentsialov golovnogo mozga cheloveka).** M. N. Rusalova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Mar.-Apr. 1981, p. 403-406. 9 refs. In Russian.

**A82-21786** † **Functional state of the hippocampal-reticular complex under submaximal physical load and fatigue (Funktsional'noe sostoianie gippokampo-retikuliarnogo kompleksa pri submaksimal'noi fizicheskoi nagruzke i utomlenii).** V. M. Boev (Orenburgskii Gosudarstvennyi Meditsinskii Institut, Orenburg, USSR) and V. A. Krauz (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Sept.-Oct. 1981, p. 1029-1037. 27 refs. In Russian.

Results are presented on 22 rabbits with bipolar electrodes implanted in the dorsal hippocampus and the midbrain reticular formation. It is shown that a submaximal physical load in nontrained animals results in a stable reduction in the excitability of the structures studied. In the course of a 30-day training program, the excitability of the hippocampus was reduced, while the excitability of the reticular formation underwent a short-term increase but then returned to the initial level on the 20th day of training. High-amplitude activity predominated in the EEG of the structures studied, while local blood flow increased only in the reticular formation. B.J.

**A82-21787** † **The relationship between cardiac and motor components of a conditioned reflex upon the local cooling of various zones of the cerebral cortex in cats (O sootnoshenii serdechnogo i dvigatel'nogo komponentov uslovnogo refleksa pri lokal'nom okhlazhdenii razlichnykh zon kory bol'shikh polusharii u koshek).** E. M. Berdichevskaia, Iu. M. Perov, and V. M. Pokrovskii (Kubanskii Meditsinskii Institut, Krasnodar, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Jan.-Feb. 1981, p. 64-69. 23 refs. In Russian.

**A82-21788** † **Coordination of processes in the hierarchic structure of the visual analyzer (Koordinatsiia protsessov v ierarkhicheskoi strukture zritel'nogo analizatora).** V. B. Val'tsev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, no. 3, 1981, p. 598-604. 21 refs. In Russian.

The effect of prolonged light stimulation on different parts of the visual analyzer was investigated in cats. The adaptation process was found to be very complex as manifested in the diverse parallel processes in the hierarchic structure of the analyzer. Adaptive reorganization in the distal parts of the retina is directed towards the regulation of general sensitivity, while in the optic channel and lateral geniculate body this reorganization is directed towards the reduction of the dependence of cortical process on fluctuations of the illumination level. The predominance of inhibitory processes in the cortex characterizes the increasing complexity of cortical processes. It is also shown that the reorganization of electrical activity expresses not only a change of sensitivity but also adaptation to many parameters which characterize the transition from darkness to light. B.J.

**A82-21789** † **Types of spontaneous discharges in muscle receptors (Tipy spontannykh razriadov myshechnykh retseptorov).** V. I. Zalkind (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia,* vol. 13, no. 3, 1981, p. 315-321. 12 refs. In Russian.

Based on an analysis of spontaneous and induced discharges from the receptors of passive m. triceps muscle spindles in cats, three types of responses have been identified: (1) continuous pulse train with unimodal symmetric intervals between pulses; (2) bunched action potentials with bimodal interval distribution; and (3) sporadic pulses with long intervals between pulses. Comparison of the characteristics of spontaneous discharges and discharges induced by static muscle stretching indicates that both types of responses have the same mechanism. It is suggested that spontaneous activity may be viewed as a static response of receptors to internal factors related to interaction between extrafusal and intrafusal muscular fibers. V.L.

**A82-21790** † **Comparative neurophysiological characteristics of cold and caudate tremors (Sravnitel'naia neirofiziologicheskaia kharakteristika kholodovogo i kaudatnogo tremora).** Iu. V. Lupandin (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Neirofiziologiia,* vol. 13, no. 3, 1981, p. 257-263. 21 refs. In Russian.

In experiments carried out on cats, comparisons are made between two models of postural tremor, one induced by exposure to cold, the other by an injection of oxotremorine into the caudate nucleus. The electromyograms of both models are identical; the frequency of activity of the motor units, which operate independently, is 4-12 pulses/sec. C.R.

**A82-21791** † **Poststimulatory auditory adaptation in humans according to computer audiometry (Poststimuliatsionnaia slukhovaia adaptatsiia u cheloveka po dannym kompiuternoi audiometrii).** B. M. Sagalovich and G. G. Melkumova (Ministerstvo Zdravookhraneniia SSSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Nosa i Gorla, Moscow, USSR). *Vestnik Otorinolaringologii,* Mar.-Apr. 1981, p. 15-20. 27 refs. In Russian.

**A82-21792** † **Cochlear analysis of sound intensity and some mechanisms of auditory sensations (Kokhlearnyi analiz sily zvuka na nekotorye mekhanizmy slukhovykh oshchushchenii).** V. N. Akimov (Kazanskii Meditsinkii Institut, Kazan, USSR). *Vestnik Otorinolaringologii,* May-June 1981, p. 15-18. 21 refs. In Russian.

**A82-21793** † **Methods for diagnosing hearing loss in workers exposed to high noise levels in accordance with state standards (Metody opredeleniia poter' slukha u rabochikh 'shumovykh' professii v sootvetstvii s gosudarstvennym standartom).** V. E. Ostapkovich, G. A. Suvorov, L. N. Shkarinov, N. I. Ponomareva, and E. I. Denisov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 12-16. 5 refs. In Russian.

**A82-21794** † **Hygienic standards for industrial noise (Gigienicheskoe normirovanie proizvodstvennogo shuma).** G. A. Suvorov, L. N. Shkarinov, V. G. Ovakimov, and E. I. Denisov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 1, 1981, p. 62-66. 10 refs. In Russian.

**A82-21795 †** **A comparative evaluation of the hemodynamic effects of large doses of morphine, dipidolor, pentazocine, and phentanyl (Sravnitel'naia otsenka gemodinamicheskikh effektov bol'shikh doz morfina, dipidolora, pentazotsina i fentanila).** F. P. Belozartsev, B. I. Islamov, and V. G. Stranin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 8, 1981, p. 22-28. 10 refs. In Russian.

Four series of experiments are carried out on 84 mongrel dogs to study the effect of morphine (3 mg/kg), dipidolor (4.5 mg/kg), pentazocine (2.5 mg/kg), and phentanyl (0.0084 mg/kg) on systemic and pulmonary hemodynamics, on myocardial contraction, and on coronary blood flow and microcirculation. It is found that in contrast to general anesthetics, large doses of the narcotic analgesics used clinically for anesthetic purposes in operations do not suppress hemodynamics. C.R.

**A82-21796 †** **Emotional stress as a factor in cardiovascular disorders (Emotsional'nyi stress kak faktor serdechno-sosudistykh narushenii).** K. V. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 9, 1981, p. 10-18. 27 refs. In Russian.

It is shown in experiments on animals that conflict can bring on serious cardiovascular orders, including ischemia and myocardial infarction. The roles played by limbic structures and by the reticular formation of the brain stem in mechanisms responsible for arterial hypertension and disturbances in cardiac activity in times of emotional stress are established. Genetic characteristics of resistance and of predisposition to stress-induced cardiovascular disorders are identified. Attention is also given to the distribution of catecholamines in the brain stem structures of the animals that are either resistant or predisposed to these disorders. C.R.

**A82-21797 †** **Computer-aided analysis of the effect of the initial narcosis on the central hemodynamics (Komp'iuternyi analiz vliianiia razlichnykh variantov vvodnogo narkoza na tsentral'nuiu gemodinamiku).** A. A. Buniatian, M. N. Seleznev, E. V. Flerov, G. I. Kalina, and Ia. A. Solomka (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchnyi Tsentr Khirurgii, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 8, 1981, p. 33-40. 20 refs. In Russian.

**A82-21798 †** **LDH isoenzyme spectrum in intact and denervated skeletal muscles of rats of various age during cold adaptation (Izofermentnyi spektr LDG v intaktnykh i denervirovannykh skeletnykh myshtsakh krys razlichnogo vozrasta pri adaptatsii k kholodu).** L. F. Shcherbak (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, Jan.-Feb. 1981, p. 69-72. 5 refs. In Russian.

**A82-21799 †** **The role of urokinase in the regulation of the fibrinolytic activity of blood under normal conditions (Rol' urokinazy v reguliatsii fibrinoliticheskoi aktivnosti krovi v estestvennykh usloviiakh).** V. I. Kuznik and D. V. Vasil'ev (Chitinskii Meditsinskii Institut, Chita, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1981, p. 45-47. 7 refs. In Russian.

**A82-21800 †** **The role of CO2 in the mechanism of the reparative regeneration of bone tissue /a radioisotopic study/ (Rol' CO2 v mekhanizme reparativnoi regeneratsii kostnoi tkani /radioizotopnoe issledovanie/).** I. M. Dmitriev (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) and Iu. A. Petrovich (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1981, p. 28-32. 14 refs. In Russian.

**A82-21801 †** **The use of oxygen as the test gas in the determination of the closing volume of respiratory ducts (Primenenie kisloroda kak test-gaza dlia opredeleniia ob'ema zakrytiia dykhatel'nykh putei).** V. E. Bagdat'ev, V. I. Platonov, I. Iu. Lapshina, and Iu. V. Andreev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Sovetskaia Meditsina*, no. 8, 1981, p. 28-31. 13 refs. In Russian.

The use of oxygen as the indicator gas in the determination of pulmonary closing volumes in the single breath expiration test is investigated. Closing volumes, calculated as the volume of gas expired at the moment when sharp changes in indicator gas concentration signal the onset of phase IV of the single breath curve, were obtained in 10 subjects with normal spirographic data by both oxygraphic and nitrographic techniques. A high degree of correlation between the results of the techniques is found, indicating the oxygraphic method to be as useful as nitrography for the examination of the small respiratory ducts. In addition, the use of oxygen as a test gas facilitates the detection of the inflection point in the single breath curve, increasing test accuracy. A.L.W.

**A82-21802 †** **Seasonal rhythm of the immune reactivity and heart tolerance to physical load in patients with ischemic heart disease (Sezonnyi ritm tolerantnosti serdtsa k nagruzke i immunnoi reaktivnosti u bol'nykh ishemicheskoi bolezn'iu serdtsa).** I. E. Oranskii, V. P. Ditiatev, I. M. Kheimonen, I. S. Golod, and E. I. Solov'eva (Sverdlovskii Nauchno-issledovatel'skii Institut Kurortologii i Fizioterapii; Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Sovetskaia Meditsina*, no. 7, 1981, p. 11-14. 8 refs. In Russian.

**A82-21803 †** **Evaluation of the functional state of the cardiovascular system in patients with ischemic heart disease with reference to the nature of their occupational activity (Otsenka funktsional'nogo sostoianiia serdechno - sosudistoi sistemy bol'nykh ishemicheskoi bolezn'iu serdtsa v zavisimosti ot kharaktera ikh trudovoi deiatel'nosti).** B. M. Kogan, L. E. Kuz'mishin, D. I. Lavrova, D. A. Sokolova, and O. S. Andreeva (Tsentral'nyi Nauchno-Issledovatel'skii Institut Ekspertizy Trudosposobnosti i Organizatsii Truda Invalidov, Moscow, USSR). *Sovetskaia Meditsina*, no. 8, 1981, p. 9-13. 13 refs. In Russian.

**A82-21804 †** **Emotions, sleep, and health (Emotsii, son i zdorov'e).** V. Rotenberg (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Nauka i Zhizn'*, Aug. 1981, p. 86-91. In Russian.

The paper reviews some of the topics discussed at the Baku symposium (held in October 1981) on search performance, motivation, and sleep. Particular consideration is given to harmful types of stress and the protective function of sleep. B.J.

**A82-21805 †** **Physical health of truck drivers in the open-pit mining industry of the far north (Sostoianie zdorov'ia voditelei avtotransporta kar'erov dobyvaiushchei promyshlennosti Krainego Severa).** G. N. German (Iakutskii Gosudarstvennyi Universitet, Yakutsk, USSR). *Zdravookhranenie Rossiiskoi Federatsii*, no. 9, 1981, p. 14, 15. In Russian.

**A82-21806 †** **A study of tropomyosins in human muscular and nonmuscular organs (Izuchenie tropomiozinov myshechnykh i nemyshechnykh organov cheloveka).** A. A. Davydov, G. F. Sycheva, and A. B. Zborovskii (Volgogradskii Meditsinskii Institut, Volgograd, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, May-June 1981, p. 330-334. 15 refs. In Russian.

**A82-21807 †** **The multiple forms of tyrosine aminotransferase in rat liver cells and their role in cellular homeostasis (Mnozhestvennye formy tirozinaminotransferazy v kletkakh pecheni krys i ikh rol' v gomeostaze kletki).** N. P. Mertvetsov (Glavmikrobioprom, Spetsial'noe Konstruktorsko-Tekhnologicheskoe Biuro Biologicheski Aktivnykh Veshchestv, Novosibirsk, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, Mar.-Apr. 1981, p. 154-166. 57 refs. In Russian.

**A82-21808 †** **The dynamics and physiological importance of the activation of the gamma-amino-butyric acid system in the brain and cardiac muscle under pain and emotional stress (Dinamika i fiziologicheskoe znachenie aktivizatsii GAMK-sistemy v golovnom mozge i serdechnoi myshtse pri emotsional'no-bolevom stresse).** F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), R. I. Lifshits (Cheliabinskii Gosudarstvennyi Pedagogicheskii Institut, Chelyabinsk, USSR), and V. I. Pavlova (Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, Jan.-Feb. 1981, p. 35-39. 7 refs. In Russian.

**A82-21809 †** **Nonesterified fatty acid metabolism during exercise in humans (Obmen neesterifitsirovannykh zhirnykh kislot**

**pri fizicheskikh nagruzkakh u cheloveka).** S. P. Anikeeva and Iu. M. Shternberg (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, July-Aug. 1981, p. 436-441. 72 refs. In Russian.

The characteristics of nonesterified fatty acid metabolism during exercise and physical training in humans are discussed. The mobilization of nonesterified fatty acids due to the action of sympathetic intermediaries during exercise is discussed, and the importance of the nonesterified fatty acids as an energy source is emphasized. Problems in the understanding of the mechanisms by which physical training increases the capability of the muscles to utilize nonesterified fatty acids are examined, and it is pointed out that the degree of fatty acid mobilization is determined by the intensity of the exercise relative to maximal oxygen uptake. Data on the variations in plasma fatty acid levels during work is reviewed, and the concepts of the plasma pool and its turnover rate are introduced as quantitative indicators of metabolic processes. Finally, attention is given to the factors determining the transport, oxidation rate and de nova synthesis of single fatty acids, carbon, and to changes in the quantitative and qualitative characteristics of nonesterified fatty acid metabolism upon the cessation of exercise. A.L.W.

**A82-21810** † **Approaches to the removal of G2-chalone from the liver of rats (Nekotorye podkhody k ochistke G2-khalona pecheni krys).** V. M. Rodionov, N. A. Kuz'micheva, A. V. Pospelova, and M. V. Pleskova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, July-Aug. 1981, p. 569-572. 15 refs. In Russian.

**A82-21811** † **The effects of daily blood sampling on creatine phosphokinase, aspartate aminotransferase and alanine aminotransferase activities in the blood serum of the monkey (Vliianie ezhednevnogo vziatiia krovi na aktivnost' kreatinfosfokinazy, AST i ACT v syvorotke krovi obez'ian).** N. E. Lemondshava and Sh. L. Dzhalagoniia (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Voprosy Meditsinskoi Khimii*, vol. 27, Jan.-Feb. 1981, p. 64-67. 11 refs. In Russian.

**A82-21812** † **Temperature dependence of alanine and aspartate aminotransferase activities in rat brain during hypothermia of various durations and adrenalectomy (Temperaturnaia zavisimost' aktivnosti alanin- i aspartat-aminotransferaz v mozge krys pri gipotermii raznoi dlitel'nosti i pri adrenalektomii).** T. N. Daudova, I. S. Meilanov, and E. Z. Emirbekov (Dagestanskii Gosudarstvennyi Universitet, Makhachkala, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, May-June 1981, p. 359-362. 7 refs. In Russian.

**A82-21813** † **Blood serum nuclease activity in healthy persons and patients with various hematological diseases (Nukleaznaia aktivnost' syvorotki krovi zdorovykh liudei i bol'nykh s nekotorymi gematologicheskimi zabolevaniiami).** M. N. Blinov, I. S. Lugenova, and A. D. Vladimirova (Leningradskii Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Leningrad, USSR). *Voprosy Meditsinskoi Khimii*, vol. 27, Mar.-Apr. 1981, p. 211-215. 17 refs. In Russian.

**A82-21814** † **Predicting the potentials of young swimmers based on clinical and physiological data (Prognozirovanie perspektivnosti iunykh plovtsov s uchetom kliniko-fiziologicheskikh dannykh).** I. P. Nikitin (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Sept. 1981, p. 22-24. 16 refs. In Russian.

**A82-21815** † **The dynamics of heart rate recovery following work of various aerobic intensities (Dinamika vosstanovleniia chastoty serdechnykh sokrashchenii posle rabot raznoi aerobnoi moshchnosti).** V. M. Alekseev (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, July 1981, p. 24-26. 11 refs. In Russian.

**A82-21816** † **Development of an automatic data bank for managing physical education of students (Razrabotka avtomatizirovannogo banka dannykh dlia upravleniia fizicheskim vospitaniem studentov).** S. S. Prapor, I. G. Sokolov, V. A. Soldatov, A. L. Galitskii, and R. M. Nosova (Moskovskii Institut Stali i Splavov, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Aug. 1981, p. 39, 40. In Russian.

**A82-21817** † **Trial on the use of stabilography in the medical supervision of boxers (Opyt ispol'zovaniia stabilografii v meditsinskom kontrole za bokserami).** E. B. Liubchinskii and R. Z. Kravets (Orenburgskii Gosudarstvennyi Meditsinskii Institut, Orenburg, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Aug. 1981, p. 23, 24. 13 refs. In Russian.

A clinical trial is presented on the application of stabilography to the detection and subsequent monitoring of vestibular impairments resulting from cranio-cerebral trauma in boxers. Oscillations of subject center of gravity while standing in the Romberg position in the frontal and sagittal planes were measured in 112 subjects over the course of six years, with 27 serving as controls and 89 boxers having undergone head trauma as the result of a knockout. Measurements made before and after injuries reveal the vestibular apparatuses of boxers having had previous equilibrium training to be more resistant to athletic trauma, indicative of a need for the development of a method for training the organs of equilibrium during the preparation of a boxer. Head traumas are also found to be occasionally accompanied by evident and persistent disorders in static coordination. The method of stabilography is thus recommended for use in the medical supervision of boxers. A.L.W.

**A82-21818** † **Rationalizing physical regimen of sedentary workers (Obosnovanie ratsional'nogo dvigatel'nogo rezhima liudei umstvennogo truda).** V. V. Mitrokhina (Moskovskii Tekhnologicheskii Institut Bytovogo Obsluzhivaniia Naseleniia RSFSR, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Aug. 1981, p. 32-34. 8 refs. In Russian.

**A82-21819** † **Effect of the functional properties of the vestibular analyzer on the effectiveness of instruction in gymnastics (Vliianie funktsional'nykh svoistv vestibuliarnogo analizatora na effektivnost' obucheniia gimnasticheskim uprazhneniiam).** A. I. Popugaev (Udmurtskii Gosudarstvennyi Universitet, Izhevsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Aug. 1981, p. 30, 31. 8 refs. In Russian.

**A82-21820** † **Mechanisms of adaptation to ergothermic hypoxemia in athletes specializing in different sports (Mekhanizmy adaptatsii k ergotermicheskoi gipoksemii u sportsmenov razlichnykh spetsializatsii).** V. A. Romanenko (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Aug. 1981, p. 22, 23. 18 refs. In Russian.

The effects of athletic training for speed, endurance or strength on physiological responses to hypoxemia resulting from physical exercise under thermal stress are investigated, along with the role of these responses in establishing the elevated heat tolerance of athletes. Measurements of heart rate, blood oxygenation, oxygen uptake, and respiratory minute volume and rate were made during ergometer exercise at an ambient temperature of 50 C and relative humidity of 60% in sprinters, distance runners and weightlifters, and a control group of students. Ergothermic stress is found to produce a less marked decrease in blood oxygenation in the athletes than in the controls which is associated with a hyperfunction of the oxygen transport system in the weightlifters, and improvements in the mechanisms of oxygen utilization and transport in the runners. In the sprinters, improved heat tolerance is related to mechanisms counteracting the effects of ergothermic hypoxemia, while the distance runners are better able to tolerate the hypoxemia. A.L.W.

**A82-21821** † **Stress and immunity in athletes (Stress i immunitet u sportsmenov).** I. D. Surkina (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Mar. 1981, p. 18-20. 9 refs. In Russian.

The effects of the physical, and emotional stresses encountered during competition on the immune status of athletes are investigated. Experiments involving a functional test (maximal exercise) and evaluation of the levels and activities of T and B lymphocytes were performed on healthy young athletes from different sports during competitive periods of various durations, at various stages of preparation and following the competitive seasons. Changes in immune processes, particularly the T system of immunity, were observed in all types of sports and in all times of the year. The suppression of the immune reaction found under the influence of the training stresses in the preparatory period is observed to be transient, and alternates with a recovery following rest. Changes in immunity are indicative of a general adaptive stress syndrome resulting in an exhaustion phase, which leads to an increased morbidity risk. Immunological monitoring may thus be used to predict individual likelinesses of becoming ill, and to develop training schedules minimizing health risks. A.L.W.

**A82-21822** † **Radiometric determination of potassium content in athletes (Radiometricheskoe opredelenie soderzhaniia kaliia v organizme sportsmenov).** O. Z. Paikin, E. V. Ivanov, V. A. Plakhtienko, and Iu. N. Shishmarev (Voennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 26, 27. In Russian.

**A82-21823** † **Characteristics of the structure and functions of the middle ear of lizards (Osobennosti stroeniia i funktsii srednego ukha iashcherits).** S. V. Smirnov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 17, July-Aug. 1981, p. 386-400. 14 refs. In Russian.

**A82-21824** † **The mathematics of immunity (Matematika immuniteta).** A. Geleva. *Nauka i Zhizn',* Mar. 1981, p. 66-74. In Russian.

The mathematical modeling of immune responses to a viral intrusion is discussed. Following a review of the functions and major components of the immune system and its interactions with the processes occurring during the course of a disease infection, a mathematical model of infection and immune responses to it is presented which is formulated in terms of viral growth, the responses of plasma cells and antibody production, and damage to the target organs. Possible applications of the model in clinical practice and to the understanding of the nature of disease are then examined. A.L.W.

**A82-21825** † **Acute experimental emotional stress in rabbits /physiological and cytochemical aspects/ (Ostryi eksperimental'nyi emotsional'nyi stress u krolikov /Fiziologo-tsitokhimicheskie aspekty/).** A. V. Gorbunova, N. V. Petrova, V. V. Portugalov, and S. K. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1981, p. 45-53. 17 refs. In Russian.

Cardiovascular and autonomic neuronal responses to acute emotional stress induced by the electrical stimulation of the hypothalamus and skin are investigated in immobilized chinchilla rabbits. Measurements of arterial pressure and heart rate were obtained as a function of time during the experiment, along with determinations of water-soluble protein content, neuronal cell body and nuclear volume and weight in neurons of the superior cervical ganglion, nodose ganglion, stellate ganglion and sympathetic chain. From the cardiovascular responses it was possible to identify three types of reactions: resistance, adaptation, and the development of stress effects. Various metabolic changes were observed in the extramural autonomic neurons of the stress-susceptible animals, the most marked being an enhancement of catabolism in the nodose ganglion. A tendency towards increased activity of the fast isoenzymes of lactate dehydrogenase is also observed in the conductive system of the heart. A.L.W.

**A82-21826** † **Comparative study of several physiological parameters in the evaluation of functional condition in nurses (Sravnitel'noe izuchenie nekotorykh fiziologicheskikh pokazatelei pri otsenke funktsional'nogo sostoianiia u meditsinskikh sester).** P. Ullsperger, H.-G. Gille, E. Otto, M. Pietschmann, B. Weickmann (Ministerstvo Zdravookhraneniia GDR, Tsentral'nyi Institut Rabochei Meditsiny, Berlin, East Germany), and L. Ia. Zybkovets (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 23-27. 11 refs. In Russian.

The effects of night work on psychophysiological reactions are investigated together with the usefulness of several neurophysiological methods in assessing functional condition following night work and sleep. Responses to auditory and visual stimuli, electrocardiograms, electrooculograms, electroencephalograms, as well as evoked potentials and contingent negative variation were observed in nurses immediately following work on the night shift or a night's sleep preceding work on the evening shift. The neurophysiological tests as well as the more routine techniques reveal a reduction in the general activity level in nurses following the night shift, which is particularly evident as a reduction in attention. Results suggest the potential applications of the techniques employed in the establishment of optimal work-rest cycles. A.L.W.

**A82-21983** † **Mathematical model of a human operator detecting a signal on a noise background (Matematicheskaia model' cheloveka-operatora, obnaruzhivaiushchego signal na fone shuma).** N. M. Novikova. *Radioelektronika,* vol. 25, Jan. 1982, p. 91-93. In Russian.

In the problem considered, the human operator must detect a signal with an unknown arrival time on a background of Gaussian noise. It is shown that the functioning of the operator can be described by a nonparametric sign detector model. The probability of correct detection is examined as a function of signal-to-noise ratio, and the effectiveness of the model is confirmed by experimental results. B.J.

**A82-21926** **An asymmetrical model of the airways of the dog lung.** K. Horsfield, W. Kemp, and S. Phillips (Midhurst Medical Research Institute, Midhurst, Sussex, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 21-26. 16 refs.

An asymmetrical model is developed for the branching of the brachial tree in dog lung. The model is based on measurements made on a resin cast of the bronchial tree of a 25-kg dog, for which dimensions and branching relationships were obtained in branches down to 0.5-mm diameter. The branches were ordered, the number in each order was counted, and the mean diameter and length in an order was calculated. The model was then constructed according to delta, the difference in order between the two daughter branches at a bifurcation, with delta taken as identical for all parent branches of a given order. The model is thus especially useful for computer analysis of such variables as input impedance. A.L.W.

**A82-21927** **Increased excretion of urea and N/tau/-methylhistidine by rats and humans after a bout of exercise.** G. L. Dohm, R. T. Williams, G. J. Kasperek, and A. M. van Rij (East Carolina University, Greenville, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 27-33. 30 refs.

**A82-21928** * **Phase V of the single-breath washout test.** G. M. Nichol, D. B. Michels, and H. J. B. Guy (Christchurch Clinical School of Medicine, Christchurch, New Zealand; California, University, La Jolla, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 34-43. 34 refs. Research supported by the Medical Research Council of New Zealand and North Canterbury Hospital; Grant No. NsG-9075.

A downward-deflecting phase V is often seen following the terminal rise (phase IV) in single-breath washout tests. To investigate the nature of phase V, experiments using simultaneous washouts of N2 and tracer boluses of Ar were performed on eight normal nonsmoking subjects aged 27-41 who exhibited a phase V. Phase V is found to occur in all subjects at expiratory flow rates between 0.1 and 2.0 l/sec shortly after expiration became flow limited. Volumes of both phases IV and V increase with increasing flow rate. The difference between the exhaled volumes at which flow became limited and phase V appeared is shown to be approximately equal to the anatomic dead space. Results support a model of lung emptying in a gravitational field in which flow limitation occurs first in the lower lung regions and then progresses toward the upper regions, causing phase IV. A decrease in the amount of flow from the upper relative to the lower regions after all regions have become flow limited then causes phase V. A.L.W.

**A82-21929** **A computational model for expiratory flow.** R. K. Lambert, T. A. Wilson, R. E. Hyatt, and J. R. Rodarte (Minnesota, University, Minneapolis; Mayo Clinic and Mayo Foundation, Rochester, MN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 44-58. 18 refs. Grant No. NIH-HL-21584.

A mathematical model of maximal expiratory flow was developed. Coupled equations describing the pressure losses in the flow and the pressure-area behavior of the airway were integrated along the airway from the periphery to the flow-limiting site. Equations describing pressure losses in the flow were adapted from studies of bronchial casts. The bronchial anatomy utilized was that described by Weibel. Bronchial mechanical properties were obtained from measurements in excised human lungs for the central airways and by extrapolations of these data for the peripheral airways. The maximal flow for air and helium predicted by the model agrees with that of five lungs from which mechanical properties were obtained. The model predictions agree with published values of density and viscosity dependence of maximal flow. At high and midlung volumes, maximal flow is determined primarily by the wave-speed mechanism. At low lung volumes, maximal flow is primarily determined by the coupling of viscous pressure losses and airway mechanical properties. (Author)

**A82-21930** **Rate of uptake of carbon monoxide at different inspired concentrations in humans.** H. A. Jones, J. C. Clark, E. E. Davies, R. E. Forster, and J. M. B. Hughes (Royal Postgraduate Medical School, London, England; Pennsylvania, University, Philadelphia, PA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 109-113. 15 refs. Grants No. NIH-HL-19737; No. NIH-5-P50-HL-15061-10.

**A82-21931** **Air embolism - Possible role of surfactant on recompression.** B. A. Hills and R. E. Barrow (Texas, University, Houston, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 119-123. 25 refs.

The influence of lung surfactants on the passage of venous gas emboli through the pulmonary circulation into arterial blood during recompression treatment is investigated. Relationships between apparent surface tension and surface area were determined with a Wilhelmy balance for the first compression of films of the pulmonary surfactants dipalmitoyl lecithin (DPL), dipalmitoyl phosphatidylethenolamine (DPPE) and sphyngomyelin under simulated physiological conditions. Results show that DPL reduces apparent surface tension appreciably more than DPPE or sphygomyelin at the same surface concentration, producing tensions below 8 dyn/cm, the highest level at which normal pulmonary systeolic pressure could force trapped air into systemic arterial blood. Additional experiments in which compression was stopped for 1-min intervals as soon as surface tension fell below 15 dyn/cm demonstrate the possibility of reaching compression levels of up to 30% without accompanying excessively low surface tension. Results support the rule of stopping compression in cases of limb bends at 60 fsw, and suggests the advisability of stopping at the depth of relief. A.L.W.

**A82-21932** **Erythrocyte indices during a competitive marathon.** M. A. Kolka, L. A. Stephenson, and J. E. Wilkerson (Indiana University, Bloomington, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 168-172. 32 refs.

Changes in erythrocyte count, plasma osmolality and erythrocyte indicators occurring within the course of long-duration exercise are investigated. Measurements of the hematocrit, whole blood hemoglobin concentration and erythrocyte counts were made in blood drawn from three healthy adult males immediately prior to and at 4.8-km intervals during a competitive marathon (42.2 km). Despite running times of 3, 4 and 5 hr, the erythrocyte count is found to decrease linearly for the first 15 km of the race in all subjects, reaching a level 4.7% below the prerace control, then to rise back to control levels by 19.3 km, where it remained for the remainder of the race. Calculated values of the mean corpuscular hemoglobin concentration, mean corpuscular hemoglobin, and total red blood cell volume did not change significantly during the race, while plasma osmolality increased linearly and mean corpuscular volume displayed a negative linear correlation with osmolality. Data demonstrate the value of obtaining sequential blood samples during an exercise bout, as well as the ability of the organism to maintain erythrocyte indices within narrow limits. A.L.W.

**A82-21933** **Summated circulatory responses of thermal and baroreflexes in humans.** T. J. Ebert, D. F. Stowe, J. A. Barney, J. H. Kalbfleisch, and J. J. Smith (U.S. Veterans Administration Medical Center, Wood; Wisconsin Medical College, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 184-189. 35 refs.

Interactions between thermal and baroreceptor inputs in the elicitation of cardiovascular reflexes are investigated in a study of the integration of multiple afferent information by the vasomotor centers. Noninvasive techniques were used to monitor variations in blood flow parameters induced by changes in central blood volume created by lower body negative pressure and leg elevation in the presence or absence of local thermal receptor stimulation by hand immersion in 10 C water. LBNP at -10, -25, and -40 Torr and leg elevation are found to result in changes in forearm vascular resistance, while the two high levels of LBNP are accompanied by decreases in stroke volume, caridac index and blood pressure and increases in heart rate and total peripheral resistance. Total peripheral resistance, forearm vascular resistance and blood pressure are also observed to increase during hand immersion. Combined stimuli induced simple additive responses in all variables except heart rate, where a central interaction between thermal and baroreflex control of heart rate is indicated. A.L.W.

**A82-21934** **Effects of temperature on the duration of arousal episodes during hibernation.** A. R. French (California, University, Riverside, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 216-220. 23 refs. Research supported by the University of California; NSF Grant No. DEB-80-03513.

**A82-21935** **Pulmonary gas exchange during altered density gas breathing.** S. K. Christopherson and M. P. Hlastala (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 221-225. 21 refs. Grants No. NIH-HL-12174; No. NIH-HL-08081-02.

The role of changes in the alveolar ventilation/perfusion distribution in determining the improvement in alveolar-arterial gas exchange observed during breathing of carrier gases with increased density is investigated. The alveolar ventilation/perfusion distribution was measured directly by the multiple inert gas elimination technique and compared to changes in the alveolar-arterial O2 partial pressure difference in dogs ventilated with room air alone or with a 20.9% O2 in He mixture. While no difference between air and heliox is observed in the overall cardiorespiratory parameters, oxygen exchange is observed to worsen with heliox breathing, as the alveolar ventilation/perfusion distribution improved slightly. It is thus concluded that the improvement in oxygen exchange cannot be explained by an improvement in ventilation/perfusion distribution; an alternative mechanism involving the interaction of diffusion and convection on inspiration is suggested. A.L.W.

**A82-21936** **Cardiac output increase and gas exchange at start of exercise.** M. L. Weissman, P. W. Jones, A. Oren, N. Lamarra, B. J. Whipp, and K. Wasserman (California, University, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 236-244. 17 refs. Grants No. NIH-HL-07388; No. NIH-HL-11907.

The dynamics of the increase in alveolar gas exchange induced by increasing cardiac output pursuant to the onset of exercise is investigated. Temporal patterns of gas exchange were measured during the first 10-20 sec of cycle ergometer exercise with minute ventilation constant at the resting level and during a single prolonged constant airflow exhalation. A rapid response of increased gas exchange following the beginning of exercise is evidenced by a progressive elevation in alveolar CO2 tension and fall in O2 tension in the controlled ventilation experiment, and by a steepening of the slope of the alveolar phase of O2 and CO2 in the prolonged exhalation experiment. These changes, which would occur during the first one to two breaths of exercise in free-breathing subjects, are attributable to a reduction in overall pulmonary ventilation/perfusion ratio as cardiac output rapidly increased. A.L.W.

**A82-21937** **Possible impact of cosmochemistry on terrestrial biology - Historical introduction.** N. W. Pirie (Rothamsted

Experimental Station, Harpenden, Herts., England). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A*, vol. 303, no. 1480, Dec. 24, 1981, p. 589-594. 29 refs.

Attention is given to opinions held by prominent men regarding the existence of life on celestial bodies other than earth, taking into account philosophers in ancient Greece, and scientists and non-scientist intellectuals in Europe. It is found that pluralism was the dominant outlook during the last few centuries. The separation of a belief in life elsewhere from a belief in intelligence elsewhere had to await the resolution of the spontaneous generation controversy. Extraterrestrial intrusion had been postulated to explain specific biological phenomena. The general proposition that all life came here from elsewhere seems to have originated with Richter (1865). The concepts of an introduction of 'seeds' from space to earth is considered along with the impact which components of meteorites and cosmic dust may have on biology. G.R.

**A82-21988** **Organic matter in meteorites and Precambrian rocks - Clues about the origin and development of living systems.** J. Brooks (British National Oil Corp., Exploration Div., Glasgow, Scotland). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A*, vol. 303, no. 1480, Dec. 24, 1981, p. 595-606; Discussion, p. 608, 609. 77 refs.

Modern hypotheses about the origin of life on earth follow suggestions made originally by Oparin (1924) and Haldane (1929) about a chemical synthesis in which precursors of biomolecules could be formed from a primitive early atmosphere. The current knowledge of the abiogenesis of organic molecules is derived from the identification of organic molecules in astronomical spectra, the presence of organic compounds in carbonaceous chondrites, studies of the organic contents in early Precambrian rocks, and laboratory experiments. The considered investigation is concerned with an evaluation of the available information against the Oparin-Haldane hypothesis, taking into account the ancient geological record and information contained in carbonaceous chondrites. G.R.

**A82-21989** **Problems in the rate of evolution in biological systems.** F. R. Whatley (Oxford University, Oxford, England). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A*, vol. 303, no. 1480, Dec. 24, 1981, p. 611-622; Discussion, p. 622, 623. 18 refs.

Questions regarding the earliest organization of systems leading to the evolution of life are considered, taking into account the amino acids of the prebiotic soup, and the adenine molecule as a component of the energy carrier ATP. Aspects of the biochemical evolution are examined, giving attention to living systems based on proteins or nucleic acids, living systems based on nucleic acids, and living systems based on nucleic acids and proteins. The origin of enzymatic systems is discussed. It is pointed out that a modern example of the self-assembly of a catalytic protein from its constituent parts can be seen in the enzyme ferredoxin. The greatest single discontinuity in the evolution of living systems is thought to be the attainment of the eukaryotic state of organization. According to the theory of serial endosymbiosis, the characteristic eukaryotic organelles are derived from unicellular symbionts. Attention is also given to the origin of chloroplasts. G.R.

**A82-22078** * # **A program for assessing pilot mental state in flight simulators.** A. T. Pope and R. L. Bowles (NASA, Langley Research Center, Hampton, VA). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 20th, Orlando, FL, Jan. 11-14, 1982, Paper 82-0257.* 16 p. 17 refs.

A program to apply proposed measures of pilot mental state in the simulator flight deck environment has been undertaken at NASA Langley Research Center. Literature survey identified a promising subset of methods for assessing workload, attention and vigilance, and task-related stress, and revealed a need for improved analytical techniques in the physiological area. An effort to apply functional modelling techniques has been initiated. A psychophysiological laboratory has been designed for simulator application. The program is designed to develop improved techniques for evaluating simulator cue fidelity and for imposing realistic workload and attentional demands on the simulator pilot. (Author)

**A82-22200** **Genetic damage in Escherichia coli K12 AB2480 by broad-spectrum near-ultraviolet radiation.** R. B. Webb and M. S. Brown (Argonne National Laboratory, Argonne, IL). *Science*, vol. 215, Feb. 19, 1982, p. 991-993. 26 refs. Contract No. W-31-109-eng-38.

**A82-22206** # **The thermal response of a human in the near-zone of a resonant thin-wire antenna.** R. J. Spiegel (U.S. Environmental Protection Agency, Health Effects Research Laboratory, Research Triangle Park, NC). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-30, Feb. 1982, p. 177-185. 14 refs.

The thermal response of a human in the near-zone of a resonant thin-wire antenna has been determined using a model consisting of a series of transient conduction equations with internal heat generation due to metabolism, internal convective heat transfer due to blood flow, external reaction by convection and radiation, and cooling of the skin by sweating and evaporation. Numerical results are presented for two cases: a human in the near-zone of a quarter-wave monopole and a half-wave dipole operating at 45 and 200 MHz, respectively. It is found that thermal effect is negligible for antennas with input power levels of less than 50 W. V.L.

**A82-22248** * **Enzymatic capacities of skeletal muscle - Effects of different types of training.** F. W. Booth (Texas, University, Houston, TX) and G. R. Hugman (Baylor College of Medicine, Houston, TX). *Medicine and Sport*, vol. 13, 1981, p. 153-164. 39 refs. Research supported by the Muscular Dystrophy Association of America; Grant No. PHS-AM-19393; Contract No. NAS9-15388.

Long-term adaptation mechanisms to maintain homeostasis at increased levels of exertion such as those caused by regular exercise are described. Mitochondrial changes have been found to be a result of endurance exercises, while mitochondrial responses to other types of exercise are small. Further discussion is devoted to long-term changes in glucose transport, hexokinase, phosphofructokinase, pyruvate kinase, and the increased sensitivity of an endurance trained muscle to insulin. Less lactate has been found to be produced by the skeletal muscles at the same work rate after adaptation to endurance exercise training, and the capacity for the flux of the two-carbon acetyl chain through the citric acid cycle increases in skeletal muscles in response to endurance training. Finally, endurance training is noted to result in glycogen sparing and an increase in the capacity to utilize fatty acids. M.S.K.

**A82-22249** * **In vitro Ca-45/++/ uptake and exchange by otoconial complexes in high and low K/+/Na/+/ fluids.** M. D. Ross, K. G. Pote, P. L. Cloke, and C. Corson (Michigan, University, Ann Arbor, MI). *Physiologist*, vol. 23, Dec. 1980, p. S-129, S-130. 10 refs. Grant No. NsG-9047.

Recently, data have been accumulating to indicate that saccular and utricular otoconial complexes of the gravity receptor organs are dynamic and interact constantly with their environment. This study investigates the possibility that the ionic composition of the surrounding fluid influences calcium ion binding and release, and explores the importance of the K(+)/Na(+) ratio. Two in-vitro methods were developed, the first of which employed artificial endolymph and perilymph while ionically balanced fluids in which only the K(+)/Na(+) was altered were used in the second. The ability of rat complexes to take up Ca-45(++) during incubation with these fluids was assessed using liquid scintillation spectrometry. In vitro uptake of Ca-45(++) was greater in fluids with a high K(+)/Na(+) ratio than in fluids in which the ratio was low. The ability of the complexes to take up Ca-45(++) appeared to decline with age. (Author)

# STAR ENTRIES

**N82-16700#** Oak Ridge National Lab., Tenn. Biology Div.
**POSSIBLE MECHANISM FOR CHEMICAL INDUCTION OF CHROMOSOME ABERRATIONS IN MALE MEIOTIC AND POSTMEIOTIC GERM CELLS OF MICE**
Walderico M. Generoso 1981 16 p refs Presented at 4th Intern. Symp. of the Radiation Biol. Center, Kyoto, 28 Sep. 1981 Sponsored in part by EPA
(DE81-031998; CONF-810966-1) Avail: NTIS HC A02/MF A01

The mechanism by which chemically induced lesions in the chromosomes of mammalian germ cells are actually converted to aberrations and transmitted to progeny are investigated. An attempt is made to explain how dominant-lethal mutations and heritable translocations are produced from chemical treatment of meiotic and postmeiotic germ cells of male mice. DOE

**N82-16701#** Environmental Protection Agency, Corvallis, Oreg. Environmental Research Lab.
**VARIATION IN PLANT RESPONSE TO OZONE: A CONCEPTUAL MODEL OF PHYSIOLOGICAL EVENTS**
D. T. Tingey and G. E. Taylor, Jr. 1980 47 p refs Presented at 32nd Symp. on Effects of Gaseous Air Pollution in Agr. and Hort., Nottingham, England, 1 Sep. 1980 Prepared in cooperation with Oak Ridge National Lab.
(Contract W-7405-eng-26)
(DE81-029692; CONF-8009172-1) Avail: NTIS HC A03/MF A01

The environment and genotype exert profound influences on a plant's ozone response. Based on the multiplicity of physiological mechanisms responsible for variable response, a common progression of events is proposed: ozone conductance (gas and liquid phase), perturbation, homeostasis, and injury. Injury is the repercussion of the preceeding events. Gas and liquid phase conductances are significant sources of variable ozone response. Genic expression and environmental stimuli affect ozone conductance and homeostasis and thereby the extent of injury. Based on conceptual model, gas phase conductance would be the decisive factor controlling injury only if it were the rate limiting step. Any physiologically significant intervening event between gas-phase conductance and injury would reduce the association between them. Either liquid phase conductance of homeostasis could reduce that association. DOE

**N82-16702#** Colorado State Univ., Fort Collins. Dept. of Microbiology.
**MICROBIOLOGICALLY-MEDIATED MUTAGENIC ACTIVITY OF CRUDE OIL Final Report, 1976 - 1979**
Bruce A. Cummings and Ronald C. Gordon Sep. 1981 302 p refs
(Grant EPA-R-805041)
(PB82-105131; EPA-600/3-81-053) Avail: NTIS HC A14/MF A01 CSCL 06T

Crude oil was incubated with raw and sterile river water samples and assayed for mutagenic activity for the Ames test to determine the ability of naturally occurring freshwater microorganisms to form mutagenic biodegradation products from crude oil. River water samples supplements with inorganic salts were incubated with one percent crude oil in Erlenmeyer flasks for 1-6 weeks and 4 and 20 C with shaking. Replicate flasks were extracted at various time intervals with 1,1-2 trichloro-1,2,2-trifluoroethane, the solvent evaporated and the residues taken up in dimethyl sulfoxide for mutagenicity testing. The extracts were assayed for mutagenic activity by the plate incorporation method of the Ames test with Salmonella tester strains TA 100, TA 1535, TA 1537, TA 1538 and TA 98. Mammalian liver microsomes were not used in the mutagenicity test system as the oil degrading microorganisms constituted the enzyme activation system in the study. GRA

**N82-16703#** Cincinnati Univ., Ohio. Inst. of Environmental Health.
**MECHANISMS OF CADMIUM ABSORPTION IN RATS**
Ernest C. Foulkes, D. R. Johnson, Naoki Sugawara, Roland F. Bonewitz, and Cathleen Voner Sep. 1981 59 p refs
(Grant EPA-R-805840)
(PB82-108184; EPA-600/1-81-063) Avail: NTIS HC A04/MF A01 CSCL 06T

The study was undertaken in order to help clarify the factors which determine the fractional absorption of an oral load of cadmium (Cd) from the intestine of the rat. The experiments utilized intact segments of intestine, perfused or incubated in situ, with their blood supply intact. Absorption of Cd from the jejunal lumen can be ascribed to a saturable membrane system, that is after short periods of exposure essentially all the metal removed from the lumen was recovered in mucosal issue (Step 1). The second step in Cd absorption, i.e., transfer of the metal from mucosa into blood, proceeded at only 1-2% of the rate of uptake from the lumen (Step 1). No evidence was obtained for a role of metal lothionein in the mucosal retention of Cd. Step 1 of Cd absorption was inhibited by a variety of exogenous and endogenous factors. Thus, zinc was found to depress Cd transport in an apparently competitive manner. Addition of milk to the lumen also inhibited Cd uptake, an effect entirely due to the Ca content. Bile salts act as endogenous modulators of Cd absorption; their effect may be related to micelle formation. The research also included studies of duodenal and ileal Cd transport. GRA

**N82-16704#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 15, NO. 6, NOVEMBER - DECEMBER 1981**
12 Jan. 1982 154 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med (Moscow), v. 15, no. 6, Nov. - Dec. 1981 (JPRS-79849) Avail: NTIS HC A08/MF A01

Articles are presented which address life support systems: human and animal physiological responses to spacecraft environments, radiation and weightlessness; and flight fatigue in helicopter crews.

**N82-16705#** Joint Publications Research Service, Arlington, Va.
**QUESTION OF REDISTRIBUTION OF BLOOD IN ORTHOSTATIC POSITION**
G. S. Belkaniya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 1-9 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 4-9

Avail: NTIS HC A08/MF A01

The concept of two interacting constituents involved in the redistribution of the circulating blood volume in orthostasis, redistribution along the vertical (hydrostatic) and functional (metabolic) gradients, is discussed. On this basis, the possible mechanism responsible for orthostatic circulatory intolerance following an exposure to bed rest or weightlessness is described. Author

**N82-16706#** Joint Publications Research Service, Arlington, Va.
**WAYS AND MEANS OF MAINTAINING HEAT BALANCE IN PILOTS AND COSMONAUTS**
A. S. Barer *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 10-18 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 9-15

Avail: NTIS HC A08/MF A01

Different principles used in systems ensuring thermal balance of pilots and cosmonauts are discussed. Physiological and hygienic characteristics of the passive thermal insulation, ventilation systems, and liquid cooling (heating) suits are presented. A classification of the means and methods is proposed. Author

**N82-16707#** Joint Publications Research Service, Arlington, Va.

**SYSTEMIC AND CEREBRAL HEMODYNAMICS IN FLIGHT PERSONNEL EXPOSED TO MODERATE HYPOXIA**

V. N. Denisov, S. F. Rayev, and I. I. Antufyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 19-23 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 16-19

Avail: NTIS HC A08/MF A01

For the purposes of medical expertise the state of systemic and cerebral hemodynamics was investigated in 66 pilots with autonomic-vascular instability and in 38 healthy subjects exposed to moderate hypoxia (in an altitude chamber). The pilots showed noticeable tachycardia or systolic hypertension, as well as certain changes in cardiac output and stroke volume. These alterations were accompanied by rheoencephalographic changes of two types one of which can be regarded as an adverse response of cerebral circulation to hypoxia. It is concluded that the study of systemic and cerebral circulation in hypoxia yields important diagnostic information that allows better estimates. M.G.

**N82-16708#** Joint Publications Research Service, Arlington, Va.

**CAUSES OF FATIGUE AMONG CREWS OF CIVIL AVIATION HELICOPTERS**

Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 24-27 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 19-22

Avail: NTIS HC A08/MF A01

The role of vibration and noise in the development of fatigue in helicopter crews was assessed. The exposure to these factors during the flying shift results in an early and marked fatigue of pilots the level of which depends on the vibration effects to a larger extent than on the noise effects. The fatigue is followed by a decline of the psychophysiological parameters characterizing the visual and motor functions as well as the ratio of the basic processes in the central nervous system. M.G.

**N82-16709#** Joint Publications Research Service, Arlington, Va.

**PHYSIOLOGICAL AND HYGIENIC EVALUATION OF VIBRATION IN THE COCKPIT OF A CARGO HELICOPTER**

Yu. G. Matveyev and Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 28-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 22-25

Avail: NTIS HC A08/MF A01

The correlations between statistical parameters of vibration in the work place, work schedules, and functional state of subjects when performing commercial flights were studied. In the cockpit of five helicopters the floor and the chair vibrated in a band of 8 Hz at a frequency of 112.5 and 114.0 dB, respectively. Before and after the flying shift 66 crewmembers were interviewed and examined. Vibration was referred to as the most unpleasant factor by 30.4% of them, noise was defined as the most unpleasant factor by 6.5% of them; 63.1% described both factors as similarly adverse. The level of psychophysiological changes was proportional to the flight time. The first signs of fatigue were seen after flights of up to 5 hours in duration, to increase drastically after flights of 6 and 7 hours. M.G.

**N82-16710#** Joint Publications Research Service, Arlington, Va.

**EVALUATION OF MAN'S ENDURANCE OF LOCAL PRESSURE TO THE HEAD AND OBJECTIVE ASSESSMENT OF HYGIENIC SPECIFICATIONS FOR PROTECTIVE HELMETS**

V. M. Sinigin, Yu. G. Konakhevich, L. N. Sholpo, and A. I. Uglanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 33-37 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 25-28

Avail: NTIS HC A08/MF A01

To obtain reference data for a statistically substantiated evaluation of man's tolerance to the local pressure on the head (as applied to protective helmets kept on for a long time), 86 experiments were carried out in which 11 test subjects participated. The local pressure of 0.05 to 0.5 kg/sq cm was applied to eight areas of the head. The tolerance time was measured as the time interval from the beginning of the exposure to the emergence of localized sensations of the type: unpleasant, painful, very painful, or intolerable. As a result, statistically significant relationships between the tolerance time and the level of the local pressure were obtained for the eight locations and four grades of subjective sensations. These data can be used in evaluating protective helmets to be worn for a long time as well as in developing hygienic requirements for the advanced helmet-like devices. Author

**N82-16711#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF TRANSMERIDIONAL FLIGHTS ON BIORHYTHM OF ZONE FORMATION BY STREPTOMYCES LEVORIS**

A. P. Savelyev, A. Kh. Akhmadiyeva, and I. G. Akoyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 38-41 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 28-31

Avail: NTIS HC A08/MF A01

The transmeridional transportation of the temperature controlled colonies of Streptomyces levoris exerted a marked effect on its biorhythms. This included changes in the growth and zone formation rates and differences in the vector of changes as related to the flight direction. The vector of changes during an east-oriented airborne flight coincided with that in orbital flight with a similar direction of transportation. These findings as well as the results of studies of seasonal and diurnal rhythms of the actinomycete zone formation suggest the synchronizing effect of the periodicity of geophysical factors. M.G.

**N82-16712#** Joint Publications Research Service, Arlington, Va.

**SIMULATION OF SOME OF MAN'S MOVEMENTS IN DIFFERENT GRAVITY FIELDS**

A. V. Zinkovskiy, I. A. Trofimova, and V. A. Chistyakov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 42-45 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 31-33

Avail: NTIS HC A08/MF A01

The control of man's movements during adaptation to an altered gravity field was modeled by mathematical methods. Two types of movements were investigated: forearm displacement with various loads and repulsions from a support in zero-G and at high G's. It was shown that movement coordination in altered gravity fields can be maintained due to a rearrangement of the control over muscle contraction which includes changes in the amplitude and pattern of joint moments in harmony with the gravity changes. M.G.

**N82-16713#** Joint Publications Research Service, Arlington, Va.

**POSITIONS, MOVEMENTS AND EQUILIBRIUM OF RATS AFTER FLIGHTS ABOARD BIOSATELLITES**

G. S. Ayzikov and A. S. Markin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 46-53 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 33-38

Avail: NTIS HC A08/MF A01

An examination of the Wistar-SPF rats flown onboard the biosatellites Cosmos 782, 936 and 1129 demonstrated significant changes in their postural, motor, and equilibrium reactions. The use of artificial gravity inflight produced a beneficial effect on the health state, motor activity, and simple reflex acts of the animals but worsened their movement coordination and equilibrium function. M.G.

**N82-16714#** Joint Publications Research Service, Arlington, Va.

**CATHEPSIN ACTIVITY OF SKELETAL MUSCLE AND**

**MYOCARDIA MYOFIBRILS AFTER EXPOSURE TO WEIGHTLESSNESS AND ACCELERATIONS**
S. S. Oganesyan and M. A. Eloyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 54-59 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 38-42

Avail: NTIS HC A08/MF A01
The rats flown onboard Cosmos-605 and exposed to a synchronous experiment for 22 days showed an increased activity of myofibrillar cathepsins in skeletal muscles of different groups. In the flight rats the increase was greater than in the synchronous ground-based animals. This suggests a significant effect of weightlessness on the cathepsic activity. The parameter was partially normalized at R+ 25 or 26 days. The exposure of rats to accelerations of 4 and 5 G for 2 min daily during 2 weeks also increased the cathepsic activity of skeletal and myocardial myofibers. The parameter returned to normal a month after completion of acceleration exposures. Thus, changes in the proteolytic activity of myofibers of different muscles induced by weightlessness and acceleration are reversible. The significance of changes in the muscle tension as related to the mechanism of stimulation of proteolytic reactions is discussed. M.G.

**N82-16715#** Joint Publications Research Service, Arlington, Va.
**CYTOKINETIC EVALUATION OF ERYTHROPOIESIS DURING LONG-TERM ORBITAL FLIGHTS**
A. V. Ilyukhin and T. Ye. Vurkovskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 60-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 42-46

Avail: NTIS HC A08/MF A01
The mechanisms of erythropoietic changes at the cellular level during a prolonged exposure to weightlessness were investigated. Following 96-, 140- and 175-day space flights cytokinetic and morphological changes in erythropoiesis were observed. The count of circulating erythrocytes decreased inflight and their life time reduced postflight. The shortening of the life time of erythrocytes postflight was paralleled by increased proliferative activity of erythroid cells. The erythrocytic balance was not reached as late as R+36 days. B.W.

**N82-16716#** Joint Publications Research Service, Arlington, Va.
**NOREPINEPHRINE AND ENZYMES OF SYNTHESIS AND DEGRADATION THEREOF IN THE RAT HYPOTHALAMUS FOLLOWING FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE**
T. Torda, R. Kvetnyanski, R. A. Tigranyan, Yu. Chulman, and A. M. Genin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 65-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 46-48

Avail: NTIS HC A08/MF A01
In the hypothalamus of weightless and centrifuged rats flown for 18.5 days onboard the biosatellite Cosmos-936, the noradrenaline concentration and activity of the enzymes involved in the catecholamine synthesis and degradation were measured. It was found that under the space flight 'influence the noradrenaline concentration and tyrosine hydroxylase, dopamine-beta-hydroxylase, and monoamine oxidase activities remained unaltered. These findings indicate that a prolonged exposure to weightlessness was not a stressogenic agent that could activate the adrenergic system in the rat hypothalamus. B.W.

**N82-16717#** Joint Publications Research Service, Arlington, Va.
**HYGIENIC PRINCIPLES OF ONGOING MONITORING OF QUALITY OF RECYCLED WATER DURING SPACE FLIGHTS**
V. M. Skuratov, V. B. Gaydadymov, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 69-72 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 181 p 48-51

Avail: NTIS HC A08/MF A01
The hygienic principles used in the evaluation of the quality of reclaimed water onboard the spacecraft are presented. The parameter required for operational control and their hygienic significance are discussed. Author

**N82-16718#** Joint Publications Research Service, Arlington, Va.
**TOXICOLOGICAL AND HYGIENIC ASPECTS OF IMPROVING ADDITIONAL PURIFICATION OF WATER RECLAIMED FROM URINE**
Z. P. Pak, G. V. Lobacheva, M. M. Spiryayeva, Yu. Ye. Bezumova, T. P. Korotkova, V. P. Petina, and Ye. S. Yevdokimova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 73-78 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 51-54

Avail: NTIS HC A08/MF A01
Comparative toxicological and hygienic studies of samples of reclaimed water obtained from urine with the use of different final purification variants were conducted. The sorption-catalytic method of urine condensate repurification using a platinum-carbon catalyst proved to be the most promising since it can ensure the production of toxicologically safe potable water. It was shown experimentally that the quality of reclaimed water as related to its chemical and toxicological parameters depends on the efficiency of the repurification unit. B.W.

**N82-16719#** Joint Publications Research Service, Arlington, Va.
**POSSIBLE USE OF HOUSE FLY LARVAE FOR UTILIZATION OF ORGANIC WASTE IN BIOLOGICAL LIFE-SUPPORT SYSTEMS**
Ye. G. Golubeva and T. V. Yerofeyeva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, v. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 79-83 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 54-57

Avail: NTIS HC A08/MF A01
Musca domestica larvae were grown in organic substrates of three types. The larval density was shown to influence certain parameters characterizing the fly life cycle and the larval utilization of the substrate. The larval development led to a decrease of the substrate mass, humidity and the content of organic matter. Man's native excrements were found to be the best substrate for M. domestica larvae. Author

**N82-16720#** Joint Publications Research Service, Arlington, Va.
**DISTINCTIONS OF REGENERATION OF CONFINED ATMOSPHERE BY MEANS OF PHOTOSYNTHESIS OF UNICELLULAR ALGAE**
G. I. Meleshko, L. M. Krasotchenko, and Ye. K. Lebedeva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 84-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 58-62

Avail: NTIS HC A08/MF A01
Systems of biological air regeneration using photosynthesis of unicellular algae are examined. An oxygen-carbon dioxide mismatch associated with the difference in gas exchange coefficients of man and algae is shown. The value and vector of the mismatch depend on the degree of the above difference. In the system balanced with respect to oxygen consumption and carbon dioxide production, the rate of the mismatch equals to 1 per cent of either process per each unit of the difference of the gas exchange coefficients in the second decimal point. Methods for regulating the algal assimilation coefficient based on the use of various nitrogen forms for algal nutrition and controlled biosynthesis are discussed. Optimal variants of gas exchange balance in the semi-closed biological life support systems are described. B.W.

**N82-16721#** Joint Publications Research Service, Arlington, Va.
**PHENOMENA OF FLUCTUATION OF HUMAN REACTION TO ANTIORTHOSTATIC POSITION**
L. Lkhagva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan.

1982 p 91-94 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 63-65
Avail: NTIS HC A08/MF A01

The biorhythmological analysis of the data obtained from seven healthy male test subjects in the head-down position at -8 deg revealed phemonena of sine-shaped reactions. This pattern was seen in the range (the difference between mean day-time and mean night-time values) of heart rate, amplitude (the difference between the maximum and minimum) of variations of body temperature and renal potassium excretion, and the evening-morning difference of body temperature variations. Author

**N82-16722#** Joint Publications Research Service, Arlington, Va.

**RESULTS OF STUDY OF HEMODYNAMICS AND PHASE STRUCTURE OF THE CARDIAC CYCLE DURING FUNCTIONAL TEST WITH LOWER BODY NEGATIVE PRESSURE DURING 140-DAY SALYUT-6 STATION FLIGHT**

A. D. Yegorov, O. G. Itsekhovskiy, I. I. Kasyan, A. P. Polyakova, V. F. Turchaninova, I. V. Alferova, V. G. Savelyeva, M. V. Domracheva, V. G. Doroshev, Ye. A. Kobzev et al *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 95-100 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 65-69

Avail: NTIS HC A08/MF A01

The two members of the 140-day permanent Salyut-6 space flight were exposed to five lower body negative pressure (LBNP) tests at -25 and -35 mm Hg for 2 and 3 min, respectively. Circulation responses to the LBNP tests were measured with respect to the heart rate, arterial pressure, chronocardiogram, and cardiac output. As compared to the preflight data, inflight responses were characterized by a greater tachycardia, preload insufficiency, and vascular tone in the absence of orthostatic intolerance. Possible mechanisms of the changes in the circulation responses are discussed. Author

**N82-16723#** Joint Publications Research Service, Arlington, Va.

**SUCCINATE DEHYDROGENASE AND CYTOCHROME OXIDASE ACTIVITY IN TISSUES OF RATS SUBMITTED TO LONG-TERM HYPOKINESIA**

V. V. Smirnov and P. P. Potapov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 101-103 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 69-71

Avail: NTIS HC A08/MF A01

The activity of cytochrome oxidase in the liver, skeletal muscles, kidneys, brain and lungs of 56 white rats decreased on days 15 and 60 of the hypokinetic study. The activity of succinate dehydrogenase significantly lowered in the brain and slightly diminished in the lungs and skeletal muscles on the same days. The activity of succinate dehydrogenase in the liver increased on the 90th hypokinetic day. Author

**N82-16724#** Joint Publications Research Service, Arlington, Va.

**LIPID SPECTRUM OF THE MYOCARDIUM OF WHITE RATS EXPOSED TO HYPOXIC HYPOXIA**

S. A. Sergeyev and G. A. Gribanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 104-108 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 71-74

Avail: NTIS HC A08/MF A01

By a modified microthin-layer chrometography the total lipid spectrum of the cardiac muscle of white rats exposed to acute oxygen deficiency in an altitude chamber was investigated. It was found that the content of total lipids, phospholipids, free cholesterol, free fatty acids and triglycerides decreased during acute hypoxia. The exposure induced changes in the amount of glycerophosphatids, phosphatid acids and polyglycerophosphatids whose content diminished significantly. The concentration of phosphatidyl serines and phosphatidyl ethanol amines lowered to a lesser extent while that of sphyngomyelins increased. Acute oxygen deficiency accelerates the release of inorganic phosphate from the heart, thus, together with other factors, leading to disorders in the heart energetics. These findings indicate an important role of hypoxic hypoxia in the disturbances of lipid metabolism of the myocardium. This needs to be taken into consideration in the diagnostics and treatment of such states. Author

**N82-16725#** Joint Publications Research Service, Arlington, Va.

**STATIONARY MAGNETIC FIELDS AND RETICULAR INFLUENCES ON ADRENERGIC AND CHOLINERGIC SYSTEMS**

L. D. Klimovskaya and A. F. Maslova *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 109-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 74-76

Avail: NTIS HC A08/MF A01

An exposure of rabbits to a constant magnetic field of 0.4 T for one hour caused increases in the blood content of adrenaline, noradrenaline, and acetylcholine, and in the adrenal content of adrenaline. Stimulation of the midbrain reticular formation led to a significant increase of the blood concentration of catecholamines and acetylcholine. After an exposure to the constant magnetic field the stimulatory effects of the reticular formation on the adrenergic systems diminished and on the cholinergic systems remained elevated. R.J.F.

**N82-16726#** Joint Publications Research Service, Arlington, Va.

**CLINICAL DISTINCTIONS OF RADIATION SICKNESS WITH EXPOSURE OF DIFFERENT PARTS OF THE HUMAN BODY TO RADIATION**

G. F. Nevskaya, G. M. Abramova, M. A. Volkova, Ye. V. Kavlycheva, A. S. Skorik, and V. V. Yurogov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 113-118 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 77-80

Avail: NTIS HC A08/MF A01

The clinical picture of radiation sickness of 139 radiological patients exposed to local irradition of the head, chest, and stomach with efficient doses of 210 rad was examined. It was found that at fractionated local irraditions the clinical symptom-complex of radiation sickness was identifical to that seen as a result of total-body irradiation. During head irradiation the major symptom was headache and during stomach irradiation nausea. The severity level of radiation damage measured with respect to the clinical symptom-complex as a whole with the aid of the bioinformation model was similar during irradiations of the head and stomach, much higher during irradiation of the chest. During head and stomach irradiations the severity level of radiation damage was proportional to the efficient dose. During chest irradiation there was no correlation between the severity level and the exposure to doses of 210 rad. Author

**N82-16727#** Joint Publications Research Service, Arlington, Va.

**METHOD OF RECORDING ROTATORY EYE REFLEXES**

M. M. Levashov and A. V. Dmitriyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 119-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec 1981 p 80-82

Avail: NTIS HC A08/MF A01

A method of recording rotatory eye reflexes in real time using polarized light is described. When a beam of light going to the photodetector is passed successively through two polarizers, illumination of the detector will depend on reciprocal orientation of polarization planes. Reciprocal rotation of polarization planes alters illumination proportionally to the cosine of angle of rotation. When the planes are parallel (0 degree angle), illumination is at a maximum, and when one of the planes is rotated 90 degrees in relation to the other, it is minimal. A miniature photoresistor is used as a detector, and it is covered with polarizing layer. The detector is placed on the anesthetized eyeball with suction cups. The light source and miniaturized amplifier unit were assembled on a mask worn over the subject's head. R.J.F.

**N82-16728#** Joint Publications Research Service, Arlington, Va.
**ELECTRODE UNIT FOR TESTING HUMAN H REFLEX**
V. I. Zborovskaya and E. A. Skiba *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 123-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 82-83

Avail: NTIS HC A06/MF A01

Use of a method of recording H reflexes that makes it possible to test the level of reflex activity of spinal motoneurons at rest and during movement, as well as to make qualitative and quantitative evaluations of various supraspinal and afferent factors is discussed. An electrode unit for electrostimulation of peripheral nerves or muscles was made. It has 6 electrodes 8-10 mm in diameter, which are mounted on an elastic dielectric plate. Rounded corners of the plate protect the skin from trauma when the electrode unit is secured firmly. The electrode unit is secured firmly to the region of the popliteal fossa, connected to the electrosimulator through a selector which connects the unit electrodes one after the other. The stimulation point is determined from the nature and magnitude of responses elicited in the muscle innervated by the stimulated nerve. R.J.F.

**N82-16729#** Joint Publications Research Service, Arlington, Va.
**COMPARATIVE ANTIHYPOXIC EFFICACY OF PRESSURE CHAMBER CONDITIONING AND FASTING OF MAN**
A. Yu. Katkov, Ye. A. Kovalenko, R. N. Chabdarova, G. A. Davydov, S. A. Vtoryy, and N. M. Utkina *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 125-128 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 84-86

Avail: NTIS HC A06/MF A01

Two theoretically possible means of enhancing men's resistance to rapidly increasing hypoxia, pressure chamber conditioning and fasting, are studied. Eleven essentially healthy men were divided into two groups. The first group of subjects was submitted to 10-day pulsed pressure chamber conditioning. The second group of subjects spent 14 days on a total fast, without limiting water intake. Endurance of hypoxia in the first group was determined before pressure chamber conditioning and immediately after it, and in the second group before the fast and on the 14th day of food deprivation. The subject was raised continuously in the chamber at the rate of 20 m/s at rest, to maximum tolerance of altitude. The subject was raised again at the same speed 30 minutes after descending to 'Earth', but with concurrent performance of exercise on a bicycle ergometer constituting 200 kg-m/minutes. In both cases, the subject had to report the current 'altitude when so instructed. In the course of the test, a continuous recording of oxygen tension in the skin of the left forearm was made by the polarographic method. At normal barometric pressure, body weight, gas exchange, morphological and gas composition, and acid-base equilibrium of capillary blood was determined. R.J.F.

**N82-16730#** Joint Publications Research Service, Arlington, Va.
**CONDITION OF MENINGEAL NERVOUS SYSTEM DURING REPEATED EXPOSURE TO TRANSVERSE ACCELERATIONS**
G. A. Konstantinovskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec 1981 (JPRS-79849) 12 Jan. 1982 p 129-132 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 86-88

Avail: NTIS HC A06/MF A01

The nerve elements of the dura and pia mater of the brain of 19 puberal cats weighing 2 to 3 kg were examined following repeated exposure to transverse accelerations (chest-back) for 20 minutes at 24-hour intervals, for 6 days. A force of 8 units with a gradient of acceleration build-up and decline of 0.5 to 0.4 unit/s was generated on a centrifuge with a 5 m arm, equipped with specially molded containers, in which the animals were immobilized in their physiological position. The cats were sacrificed using ether fumes at different times after the experiments: 1, 3, 7, 30 and 90 days, which enabled experimentors to track the dynamics of recovery processes. The meninges of five intact animals of the same ages and weight served as a control. Nervous elements were demonstrated by means of silver nitrate impregnation, according to Bielschowsky, in various modifications, followed by gold-plating and additional staining with nuclear-plasma stains. R.J.F.

**N82-16732*#** Electro-Optics Consultants, Inc., Huntsville, Ala.
**DETECTION OF AMBLYOPIA UTILIZING GENERATED RETINAL REFLEXES** Final Report
J. H. Kerr and S. H. Hay 13 Nov. 1981 52 p refs
(Contract NAS8-33819)
(NASA-CR-161944; Rept-5153-33819) Avail: NTIS HC A04/MF A01 CSCL 06E

Investigation confirmed that GRR images can be consistently obtained and that these images contain information required to detect the optical inequality of one eye compared to the fellow eye. Digital analyses, electro-optical analyses, and trained observers were used to evaluate the GRR images. Two and three dimensional plots were made from the digital analyses results. These plotted data greatly enhanced the GRR image content, and it was possible for nontrained observers to correctly identify normal vs abnormal ocular status by viewing the plots. Based upon the criteria of detecting equality or inequality of ocular status of a person's eyes, the trained observer correctly identified the ocular status of 90% of the 232 persons who participated in this program. T.M.

**N82-16733#** Civil Aeromedical Inst., Oklahoma City, Okla.
**FATIGUE IN FLIGHT INSPECTION FIELD OFFICE (FIFO) FLIGHT CREWS**
C. E. Melton, J. M. McKenzie, S. M. Wicks, and J. T. Saldivar Apr. 1981 51 p refs
(AD-A106791; FAA-AM-81-13) Avail: NTIS HC A04/MF A01 CSCL 06/19

Studies related to FIFO aircrew stress and fatigue were carried out at seven FIFO's in the Continental U.S. Forty-one men served as subjects and all crew positions were presented. Each crewmember was studied during flight activities and during office based activities. Generally, crews were in travel status during flight inspection activities and away from the office for 5 d. Crewmembers completed fatigue checklists before and after each duty on every workday. Urine specimens were collected that represented the night sleep period and the work period; they were analyzed for 17 ketogenic steroids, epinephrine, and norepinephrine, and values were expressed as weight per hundred milligrams of urinary creatinine. Ambulatory electrocardiograms were recorded for determination of heart rate (HR) during work. The data indicate that office work is distinctly less fatiguing than flight work. This finding is supported by the HR data that indicate a lower workload in the office than in flight. The statement is commonly made by crewmembers that office work is more fatiguing than flight work. It is probable that such statements are based on work preference rather than work level. Some crewmembers at Oklahoma City, Atlanta, Los Angeles, and Battle Creek show severe fatigue associated with flight work. GRA

**N82-16734#** Desmatics, Inc., State College, Pa.
**ACCELERATION MEASURES AND MOTION SICKNESS INCIDENCE**
Carl A. Mauro and Dennis E. Smith Nov. 1981 24 p refs Presented at the Intern. Workshop on Res. Methods in Human Motion and Vibration Studies, New Orleans 16-18 Sep. 1981
(Contract N00014-79-C-0128; NR Proj. 207-037)
(AD-A107996; TR-112-10) Avail: NTIS HC A02/MF A01 CSCL 06/19

An important aspect of motion sickness research is to establish quantitative relationships between sickness incidence and various parameters of the motions that induce sickness. At present, however, only wholebody vertical sinusoidal motion has been studied to any reasonable degree. The purpose of this report is to examine the predictive utility of six different characterizations of sinusoidal motion and to investigate their possible extension to dual frequency motion. Author (GRA)

**N82-16735#** Oak Ridge National Lab., Tenn. Chemical Effects Information Center.
**CHEMICALS IDENTIFIED IN HUMAN BIOLOGICAL MEDIA**
M. Virginia Cone and Cindy Stroup (EPA) 1981 6 p refs Presented at 2nd EPA/NCI Ann. Collaborative Workshop Environ.

and Occupational Cancer Studies, Rockville, Md., 9-11 Sep. 1981
(Contract W-7405-eng-26)
(DE81-030813; CONF-810959-1) Avail: NTIS HC A02/MF A01

Sources of data are from the world literature, retrospective to 1974. Information from approximately 1500 documents is in the data base at the present time. The data base contains information on 750 chemicals. Approximately 10% of the total documents in the file concerned pesticides; 30% drugs; and 40% metals. The remaining 20% were about other substances, including industrial chemicals and organics which are of interest to NCI and EPA. T.M.

**N82-16736#** Michigan Univ., Ann Arbor. Highway Safety Research Inst.
**REVIEW OF LITERATURE AND REGULATION RELATING TO THORACIC IMPACT TOLERANCE AND INJURY CRITERIA Final Report, Jul. 1980 - Jun. 1981**
Robert L. Hess, Kathleen Weber, and John W. Melvin Jul. 1981 281 p refs Sponsored in part by Motor Vehicle Manufacturers Association
(PB82-108697; UM-HSRI-81-38) Avail: NTIS HC A13/MF A01 CSCL 06S

The technical and scientific literature dealing with thoracic injury to or within the rib cage, from blunt loading is reviewed. The history of the development of associated Federal Motor Vehicle Safety Standards is reviewed from the aspect of its relationship to the history of development of the research information. Field case data from car-to-car and car-to-tree/pole crashes has been examined and summarized. This study suggests that the laboratory research has not adequately covered the principal variables found to exist in actual injury cases. Specifically more research attention should be given to the shape of the impactor, to the loading location and directory, and to injuries in the contusion and/or laceration family. Correspondingly, the accident investigation process needs to be more sensitive to occupant/vehicle interior interaction variables so that laboratory research can be properly guided. GRA

**N82-16737#** Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
**HUMAN REACTIONS TO ELF ELECTRIC AND MAGNETIC FIELDS: AN ANNOTATED BIBLIOGRAPHY OF CURRENT LITERATURE**
J. Patrick Reilly Jul. 1981 42 p
(PB82-102567; PPSP/JHU/PPSE-T-20) Avail: NTIS HC A03/MF A01 CSCL 06P

This annotated bibliography lists current literature (since 1960) which applies to human reactions to electric and magnetic fields from 10 Hz to 100 Hz, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which uses animal studies to draw interferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection. GRA

**N82-16738#** Centro Informazioni Studi Esperienze, Milan (Italy).
**IN VIVO RECORDING OF BLOOD VELOCITY PROFILES AND STUDIES IN VITRO OF PROFILE ALTERATIONS INDUCED BY KNOWN STENOSES**
M. Bassini, E. Gatti (Politecnico di Milano), T. Longo (Milan Univ.), G. M. Martinis, P. Pignoli (Milan Univ.), and P. L. Pizzolati 1980 36 p refs Presented at the 4th Intern. Conf. of the Cardiovascular System Dyn. Soc. Peripheral Vascular Hemodyn.: Basic and Clinical Aspects, Miami, Fla., 12-15 Nov. 1980
(PB81-244139; CISE-1655) Avail: NTIS HC A03/MF A01 CSCL 06B

Measurements were obtained with a pulsed ultrasonic instrument based on the analysis of the cross-correlation function of blood diffused echoes. The alterations and velocity in the time domain were studied in vitro as function of the distance between stenosis and measuring point, and position of the sample volume along the diameter. These studies may be useful for a better comprehension of blood velocity measurements made with ultrasound equipments for clinical non-invasive diagnostic purposes. T.M.

**N82-16739#** Rice Univ., Houston, Tex. Dept. of Psychology.
**CHOOSING AMONG ALTERNATIVES WITH UNCERTAIN OUTCOMES: EFFECT OF PRIOR CURING AND ESTIMATION REQUIREMENTS**
Shanta P. Kerkar and William C. Howell Aug. 1981 45 p refs
(Contract N00014-78-C-0555; NR Proj. 197-050)
(AD-A106143; TR-81-2) Avail: NTIS HC A03/MF A01 CSCL 05/1

Previous investigations by the authors have shown that judgments of frequency or probability have a facilitatory influence on subsequent predictive choice performance. The present study examined both these judgement processes more closely in an attempt to understand how they affect choices. Five groups of subjects served as emergency vehicle dispatchers for a hypothetical city. The experimental design involved a 2 x 2 factorial combination of response set and estimation task. More specifically, response set, defined as expectation of a frequency or probability response requirement, was crossed with actual response requirement, either frequency or probability estimation, in a between-groups design. Author (GRA)

**N82-16740#** RAND Corp., Santa Monica, Calif.
**AN ANALYSIS OF COGNITIVE MAPPING SKILL Interim Report**
Perry W. Thorndyke and Sarah E. Goldin Mar. 1981 66 p refs
(Contract MDA903-79-C-0549)
(AD-A106145; RAND/N-1664-ARMY) Avail: NTIS HC A04/MF A01 CSCL 08/2

Compares the performance of good and poor cognitive mappers on a variety of spatial knowledge acquisition and judgment tasks. Cognitive mapping skill was assessed by measuring subjects' knowledge of a highly overlearned environment, their home community. Subjects categorized as good or poor cognitive mappers participated in a series of experiments that examined learning a novel environment from navigation experience, map learning, map using and map interpretation, spatial judgments based on a memorized map, and navigation in a novel environment based on a memorized map. Good mappers performed more accurately than poor mappers in learning a novel environment, learning maps, and making spatial judgments based on a memorized map. Map using, map interpretation, and navigation tasks did not distinguish good from poor mappers. We conclude that, relative to poor mappers, good cognitive mappers are better able to encode and retain spatial information in memory and to mentally transform or manipulate spatial information in order to make spatial judgements, and we hypothesize that differences in spatial visualization and visual memory abilities may underlie these variations in task performance. Author (GRA)

**N82-16741#** RAND Corp., Santa Monica, Calif.
**ABILITY DIFFERENCES AND COGNITIVE MAPPING SKILL Interim Report**
Perry W. Thorndyke and Sarah E. Goldin Mar. 1981 66 p refs
(Contract MDA903-79-C-0549)
(AD-A106389; RAND/N-1667-Army) Avail: NTIS HC A04/MF A01 CSCL 08/2

Compares good and poor cognitive mappers on a number of individual difference variables potentially related to cognitive mapping skill: spatial abilities, visual/verbal processing style, motivation, and experience. Good and poor mapper groups were given several assessment tests for each of these categories. Comparisons of good and poor mappers' performance on these tests indicated that only spatial abilities reliably distinguished good mappers from poor mappers. Good cognitive mappers showed greater visualization ability, spatial orientation ability, visual memory, and field independence. Other measures showed no between-group differences. It is concluded that spatial ability is a major determinant of cognitive mapping skill and that spatial ability tests can be used to select personnel for tasks requiring navigation, orientation, and spatial judgment skills. Author (GRA)

**N82-16742*#** Minnesota Univ., St. Paul. Dept. of Food Science and Nutrition.
**STORAGE STABILITY AND IMPROVEMENT OF INTERMEDIATE MOISTURE FOODS, PHASE 5 Final Report, 1 Oct. 1976 - 28 Feb. 1978**
Theodore P. Labuza 28 Feb. 1978 399 p refs
(Contract NAS9-12560)
(NASA-CR-167503) Avail: NTIS HC A17/MF A01 CSCL 06H

A method for measuring water binding (a sub w) in gels which was developed and applied to various macromolecular geling agents in order to elucidate their mechanism of water binding was confirmed with concurrent studies using NMR, X-ray diffraction and dye diffusion. The vapor pressure manometric method for a sub w was further refined to give a sub w to + or - 0.0001 units, and a new fiber cup procedure was tested against it. The effectiveness of low a sub w on inhibiting potential toxin production by S. aureus was demonstrated. In addition, ethanol, was shown to be an effective antimicrobial agent at low concentration in lowered a sub w systems. The results of a study of vitamin C loss during processing at high temperature (60-150C) show a change to zero order kinetics due to poor oxygen solubility. Steady state temperature data can be used to predict losses during unsteady state processing. Non-enzymatic browning can be reduced at higher process temperature if residence time decreases. A shelf stable IMF processed cheese food was developed and shown to be acceptable in storage.

A.R.H.

**N82-16743*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**A HYDRODYNAMIC MODEL OF AN OUTER HAIR CELL**

Bo O. Jacobson 1982 14 p refs To be presented at the 19th Ann. Northeast Bioengr. Conf., Hanover, New Hampshire, 15-16 Mar. 1982; sponsored by the Thayer School of Engineering Dartmouth Med. School, IEEE, ASME, and the American Society for Engineering Education
(NASA-TM-82773; E-1086) Avail: NTIS HC A02/MF A01 CSCL 06P

On the model it is possible to measure the force and the force direction for each individual hair as a function of the flow direction and velocity. Measurements were made at the main flow velocity .01 m/s, which is equivalent to a flow velocity in the real ear of about 1 micrometer/s. The kinematic viscosity of the liquid used in the model was 10,000 times higher than the viscosity of perilymph to attain hydrodynamic equality. Two different geometries for the sterocilia pattern were tested. First the force distribution for a W-shaped sterocilia pattern was recorded. This is the sterocilia pattern found in all real ears. It is found that the forces acting on the hairs are very regular and perpendicular to the legs of the W when the flow is directed from the outside of the W. When the flow is reversed, the forces are not reversed, but are much more irregular. This can eventually explain the half wave rectification of the nerve signals. As a second experiment, the force distribution for a V-shaped sterocilia pattern was recorded. Here the forces were irregular both when the flow was directed into the V and when it was directed against the edge of the V.

T.M.

**N82-16744#** Lincoln Lab., Mass. Inst. of Tech., Lexington.

**THE EFFECTS OF MICROPHONES AND FACEMASKS ON LPC VOCODER PERFORMANCE**

Elliot Singer 25 Sep. 1981 25 p refs
(Contract F19628-80-C-0002; AF Proj. 2283)
(AD-A107908; TR-584; ESD-TR-81-277) Avail: NTIS HC A03/MF A01 CSCL 05/8

The effects of oxygen facemasks and noise cancelling microphones on LPC vocoder performance were analyzed and evaluated. Likely sources of potential vocoder performance degradation included the non-ideal frequency response characteristics of the microphone, the acoustic alterations of the speech waveform due to the addition of the facemask cavity, and the presence of breath noise imposed by the close-talking requirement. It is shown that the presence of the facemask produces a vowel-dependent reduction in the bandwidths of the upper speech formants. In addition, the low frequency emphasis normally associated with small enclosures is shown to occur when a pressure microphone is employed for transduction. Noise cancelling microphones, which are sensitive to the pressure gradient, do not exhibit this effect. Finally, an acoustic tube model of the vocal tract and facemask is presented which predicts the absence of spurious resonances within the frequency band of typical narrowband vocoders. Evidence supporting these assertions is presented based on observed vowel spectra. Evaluations performed using Diagnostic Rhyme Tests indicate that the presence of the oxygen facemask and noise cancelling microphone does not result in a significant increase in the LPC vocoder processing loss. Author (GRA)

**N82-16745#** Bunker-Ramo Corp., Westlake Village, Calif. Electronics Systems Div.

**PILOT WORKLOAD: A SURVEY OF OPERATIONAL PROBLEMS** Final Technical Report, Apr. 1979 - Sep. 1980

Larry Butterbaugh, Debbi Warner, Peter Lovering, and Sam Herron Wright-Patterson AFB AFWAL Aug. 1981 186 p refs
(Contract F33615-78-C-3614; AF Proj. 2403)
(AD-A107758; AFWAL-TR-81-3011) Avail: NTIS HC 09/MF A01 CSCL 01/3

Five hundred and seventy three USAF pilots responded to a survey which had as its objective the identification of operational, crew station design related causes of high pilot workloads. The survey consisted of mailed survey forms and personal interviews structured to conform with the critical incident technique of collecting user-provided data. The survey canvassed over 50 USAF organizations in collecting data for more than 30 currently flown USAF aircraft types. The role of control/display design, crew station design, and equipment malfunctions play in contributing to cockpit workload is unique to each aircraft. Other factors, such as weather, flight schedules, and mission phase appear to contribute to cockpit workloads in most all the aircraft surveyed. Further, the reported situations, or critical incidents, indicate that high workloads result from the simultaneous occurrence or existence of several causes. For example, a high workload situation reported for the FB-111 consisted of an equipment failure while flying the low level penetration portion of a mission at night. All data collected has been catalogued for the establishment of an information base, and available for future use in conjunction with aircraft development programs or modernization/retrofit programs. Author (GRA)

**N82-17229#** Joint Publications Research Service, Arlington, Va.

**STATUS OF SPACE BIOMEDICAL PROGRAMS**

Avadsilk Ignatyevich Burnazyan *In its* USSR Rept.: Space, No. 14 (JPRS-79711) 22 Dec. 1981 p 29-33 Transl. into ENGLISH from Pravda (Moscow), 16 Jun. 1981 p 3

Avail: NTIS HC A05/MF A01

Four specialized biological satellites in the Cosmos series conducted research to study the mechanisms of the effect of weightlessness, the combined effect of weightlessness and ionizing radiation, and the biological effect of artificial gravity on living systems. Devices developed included: a centrifuge for the creation of artificial gravity, an irradiator, instruments for rowing and fixing plant organisms. The cardiovascular system as studied during the so-called period of acute adaptation to weightlessness (the first 7 days of a flight). Special features of central and peripheral blood circulation and blood circulation in the brain were studied. A ballistic cardiography method judged the contractive function of the evaluated dynamics of blood flow, and detected functional disruptions in the cardiovascular system. A densiotography method was also used. An 'Oxygen' physiological experiment was performed utilizing a portable 'Oxymeter' instrument to determine oxygen pressure level changes and its consumption by body tissues. Radiation safety tests were also conducted using thermoluminescent dosimeters. Results of these tests are given. A center for processing of the data and hygienic and biophysical information that serves as a consultative-prognostic group is also described.

M.D.K.

**N82-17810** Rush Univ., Chicago, Ill.

**SOME MECHANISMS OF CALCIUM TRANSPORT BY THE CARDIAC SARCOLEMMA** Ph.D. Thesis

Ronald F. Ledvora 1981 80 p
Avail: Univ. Microfilms Order No. 8124733

Purified sarcolemmal membrane vesicles were prepared from frozen dog heart ventricles by a combination of differential and sucrose step gradient ultracentrifugation. The Ca ++ flux measurements were made using a rapid filtration technique. About 80 percent of the Ca(++) accumulated by Na(+)/Ca(++) exchange or Ca(++)/Ca(++) exchange could be released as free Ca(++), while up to 20 percent was probably bound. The mechanisms for Na(+)/Ca(++) exchange and Ca(++)/Ca(++) exchange are located in the sarcolemmal membrane of cardiac muscle cells. Both processes transport freely-exchangeable Ca(++) across the membrane. Electrogenic Na(+)/Ca(++) exchange may influence the excitability of the cardiac muscle cell. Both processes are probably carrier mediated transport mechanisms, although not by the same carrier. Both Na(+)/Ca(++) exchange and Ca(++)/Ca(+) exchange probably play important roles as Ca(++) homeostatic mechanisms in the cardiac muscle cell. Dissert. Abstr.

**N82-17811** Illinois Univ. at Urbana-Champaign.

**THE STRUCTURE AND FUNCTION OF CHLOROPHYLL-**

### PROTEINS IN PHOTOSYSTEM 1 AND THE LIGHT HARVESTING COMPLEX OF PHOTOSYSTEM 2 Ph.D. Thesis

John Emerson Mullet 1980 150 p
Avail: Univ. Microfilms Order No. 8127654

The functional units of chloroplast membranes which mediate photosynthetic electron transport from water to NADP are structurally organized into integral complexes. Two of these membrane-bound complexes, Photosystem I (PSI) and Photosystem II (PS II), consist in part of chlorophyll proteins. Photosystem I complexes were isolated by a technique which allowed purification of PSI which retained characteristics attributed to PS I in vivo. The purified PS I complexes were further fractionated by detergent treatment and PS I complexes which were depleted of chlorophyll proteins were isolated. The major chlorophyll-protein of chloroplast membranes which is structurally organizing into light harvesting complexes associuted with PS II was isolated and characterized and its role in thylakoid adhesion tested. The chlorophyll-protein complex, termed LHC-II, were incorporated into lipid vesicles: this preparation was used to demonstrate the involvement of LHC-II in cross-membrane adhesion between thylakoid membranes. Dissert. Abstr.

**N82-17812#** Joint Publications Research Service, Arlington, Va.

### USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 15, NO. 5, SEP. - OCT. 1981

O. G. Gazenko, ed 2 Nov. 1981 146 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981
(JPRS-79346) Avail: NTIS HC A07/MF A01

The varied effects of space flight factors on the human body are addressed. Results of simulation studies as well as data gathered in-flight are presented. Experimental studies performed on rats flown onboard various Cosmos satellites are also included.

**N82-17813#** Joint Publications Research Service, Arlington, Va.

### IN-FLIGHT DIETS AND QUANTITATIVE ADEQUACY THEREOF TO PILOT EXPENDITURE

I. G. Popov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 1-13 refs Transl. into English from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 4-14

Avail: NTIS HC A07/MF A01

Nutrition of aircraft crews in prolonged flights is discussed. Meal arrangements in flights of up to 4 hours, physiological-hygienic requirements to flight diets and, on this basis, possible improvement of crew nutrition through a better utilization of meals on the ground are addressed. The Soviet and foreign data on pilot energy expenditures and caloric value of diets in flights over 4 hours are reviewed with emphasis on potential development of excessive food intake with symptoms of acute overeating in prolonged flights. J.M.S.

**N82-17814#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF STATIONARY MAGNETIC FIELD ON THE ENDOCRINE SYSTEM

Ye. A. Zagorskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 14-20 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 14-17
Avail: NTIS HC A07/MF A01

It is indicated that endocrine glands react to the constant magnetic field (CMF). The phasic pattern of the hypophyseal-adrenal reaction and GMF effects on the sympathoadrenal system and thyroid are discussed. The potential therapeutic applications of the CMF is addressed with emphasis on the fact that most morphological data available need biochemical support. J.M.S.

**N82-17815#** Joint Publications Research Service, Arlington, Va.

### DIET OF CREWS OF THREE MAIN EXPEDITIONS ABOARD SALYUT-6 ORBITAL STATION

V. P. Bychkov, S. Kalandarov, M. V. Markaryan, N. D. Radchenko, K. A. Stepchkov, and M. L. Frumkin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 21-25 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 17-20
Avail: NTIS HC A07/MF A01

The advanced space diets of three prime crews who made 96-, 140- and 175-day flights aboard Salyut-6 are described. It is concluded that the diets facilitated maintenance of a good nutrient status, high work capacity and normal health condition. J.M.S.

**N82-17816#** Joint Publications Research Service, Arlington, Va.

### AMINO ACID METABOLISM DURING PROLONGED INTAKE OF DEHYDRATED FOODS AND SIMULATION OF SOME SPACE FLIGHT FACTORS

V. P. Bychkov, I. I. Borodulina, and T. F. Vlasova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 26-29 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. Oct. 1981 p 21-23

Avail: NTIS HC A07/MF A01

Forty-two healthy volunteers, aged 19 to 40, participated in three bed rest studies of 69 to 180 days in duration. The test subjects were kept on the diet consisting of dehydrated foods: fresh, stored for up to 2 years, and exposed to proton irradiation at a dose of 24,000 rad. Metabolism of amino acids was investigated under these conditions. It was concluded that during prolonged storage and irradiation proteins of dehydrated foods retained their biological value. This allows their use in long term space flights. Author

**N82-17817#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF SPACE FLIGHTS OF DIFFERENT DURATION ON ENERGY METABOLISM OF HUMAN ERYTHROCYTES

A. S. Ushakov, S. M. Ivanova, S. S. Brantova, and O. I. Labetskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 30-34 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 23-27

Avail: NTIS HC A07/MF A01

The energy metabolism of red blood cells of cosmonauts was investigated bufore and after flights of varying duration. Certain changes in red blood metabolism were found after prolonged space flights. Author

**N82-17818#** Joint Publications Research Service, Arlington, Va.

### PREVENTION OF STAPHYLOCOCCAL INFECTIONS DURING SPACE FLIGHTS

S. N. Zaloguyev, A. N. Viktorov, V. P. Gorshkov, T. Yu Norkina, and M. M. Shinkareva *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 35-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 27-29
Avail: NTIS HC A07/MF A01

The incidence of carriers of photogenic staphylococci among cosmonauts and candidates (applicants) for positions of crew members in spacecraft was investigated. The staphylococcal flora of carriers were assessed while they participate in space flights varying in duration. Samples of microflora were taken from people in their ordinary habitat by means of cotton swabs. To collect samples of miroflora from cosmonauts while in the cabin of a spacecraft, specially developed test tubes containing a preservative were used. The material was analyzed under laboratory conditions after delivering specimens to Earth. Pathogenic staphylococci (Staph. aureus) were identified by testing the capacity to decompose mannitol under anaerobic conditions, production of the enzymes, coagulase and lecithinase, as well as on the basis of presence and intensity of toxin production, in the isolated cultures. The strains of pathogenic staphylococci were submitted to phage typing using the international set of staphylococcal bacteriophages. J.M.S.

**N82-17819#** Joint Publications Research Service, Arlington, Va.

### HUMAN ADRENOSYMPATHETIC SYSTEM DURING IMMERSION IN WATER

N. A. Davydova, R. A. Tigranyan, and Ye. B. Shulzhenko *In its*

USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 39-44 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 30-34

Avail: NTIS HC A07/MF A01

The activity of the sympathoadrenal system (SAS) of 12 volunteers exposed to water immersion for 7 days was studied. Before and after water immersion, six of the test subjects were exposed to acceleration of +3 Gz for 15 min. It was demonstrated that water immersion increased the hormonal activity and decreased the transmitter activity of the SAS. Exposure to acceleration stimulated the SAS, thus increasing immersion tolerance. Author

**N82-17820#** Joint Publications Research Service, Arlington, Va.

**COMBINED EFFECT OF SIMULATED WEIGHTLESSNESS AND ACCELERATIONS ON ENERGY METABOLISM ENZYMES**

Ye. G. Vetrova, T. Ye. Drozdova, R. A. Tigranyan, and Ye. B. Shulzhenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 45-49 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 34-38

Avail: NTIS HC A07/MF A01

Exposure to simulated weightlessness (7 day water immersion and 7 day head-down tilt) caused a decrease in the activity of malate (MDH) and isocitrate dehydrogenase (ICDH), and creatine phosphokinase (CPK) at the expense of its MM isoform whereas the activity of alanine (ALT) and aspartate aminotransferase (AST) and pattern of distribution of MDH isoforms remained unchanged. Exposure to acceleration of +3 Gz before and after simulated weightlessness revealed similar changes in the activity of MDH, ICDH, ALT, AST and MDH cytoplasmic fractions. However, the higher increase in the enzyme activity after simulated weightlessness may give evidence for a greater change in cell membrane permeability during acceleration effects that followed simulated weightlessness. Author

**N82-17821#** Joint Publications Research Service, Arlington, Va.

**CARDIAC OUTPUT AND CARDIAC CYCLE PHASE STRUCTURE OF PILOTS DURING FLIGHTS**

V. A. Degtyarev, V. S. Bednenko, A. B. Vasilyev, A. N. Kozlov, V. Ya. Kolyagin, and A. P. Yarunin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 50-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 38-41

Avail: NTIS HC A07/MF A01

Changes in cardiac output and systolic time intervals of pilots in-flight were examined by the Doppler ultrasound method. The changes were related to the degree of complexity of different flight stages. It is recommended that the above parameters be monitored during flight training in order to standardize professional loads. Author

**N82-17822#** Joint Publications Research Service, Arlington, Va.

**HUMAN LIPID METABOLISM DURING CONFINEMENT IN PRESSURE CHAMBER**

V. P. Bychkov and O. S. Khokhlova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 55-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 41-43

Avail: NTIS HC A07/MF A01

The effect of prolonged enclosure, changed diet, atmosphere, and hypolinesia on lipid metabolism was investigated in 115 test subjects during 27 experimental runs. It was conducted that the changes in lipid metabolism occurred primarily due to reduced work load. Author

**N82-17824#** Joint Publications Research Service, Arlington, Va.

**VITAMIN C, B SUB 1 AND B SUB 6 EXCRETION IN URINE DURING 182-DAY ANTIORTHOSTATIC HYPOKINESIA**

V. P. Bychkov and V. A. Korshunova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 63-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 46-49

Avail: NTIS HC A07/MF A01

Renal excretion of ascorbic acid, thiamin, and 4-pyridoxic acid was studied in 18 test subjects exposed for 182 days to head-down tilt. Two groups of subjects (6 subjects in each) performed exercises of different work load and the third control group was exposed to hypokinesia as such. It is shown that exercises produced a beneficial effect on vitamin metabolism. It is recommended to develop preliminary adaptation to the work load planned as a countermeasure in real or simulated weightlessness. Author

**N82-17825#** Joint Publications Research Service, Arlington, Va.

**JUGULAR, RIGHT ATRIAL PRESSURE AND CEREBRAL HEMODYNAMICS OF HEALTHY MAN SUBMITTED TO POSTURAL TESTS**

V. Ye. Katkov, V. V. Chestukhin, V. V. Rumyantsev, A. Z. Troshin, and O. Kh. Zybin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 6873 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 49-53

Avail: NTIS HC A07/MF A01

Ten test subjects were catheterized and exposed to head up and head down tilts at 10, 30, and 75 deg for 5 min each to measure blood pressure in the upper bulb of the internal jugular vein and right atrium. Blood acid base equilibrium, hemoglobin content, and oxygen saturation were also determined. In the head up position at 75 deg the jugular pressure decreased, remaining positive (2.8 mm Hg) in most cases, whereas the atrial pressure fell down to reach the subatmospheric level. In the head down position the jugular pressure increases in proportion to the tilt angle, amounting to 32.2 mm Hg at 75 deg the atrial pressure changed in a different fashion: in 7 cases it increased and in 3 cases decreased. Throughout the test the oxygen arteriovenous difference in the brain and the acid base equilibrium in the outflowing blood remained essentially unchanged. This reflects autoregulation of the cerebral blood flow and its adequacy to metabolic requirements. Author

**N82-17826#** Joint Publications Research Service, Arlington, Va.

**EFFECTS OF EMBIENT PARAMETERS ON MAN**

R. M. Arslanova, I. Ye. Genelina, V. Ye. Manoylov, L. K. Sapozhkov, and S. K. Churina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 74-77 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 53-55

Avail: NTIS HC A07/MF A01

The effects of meteogeophysical parameters on the incidence of cardiovascular disorders were studied. It is shown that geomagnetic activity has a negative effect on the incidence and that at certain seasons this effect is minimal. Author

**N82-17827#** Joint Publications Research Service, Arlington, Va.

**ANTIHYPOXIC EFFICACY OF INTERMITTENT MODE OF PRESSURE CHAMBER CONDITIONING OF MAN**

A. Yu. Katkov, Ye. A. Kovalenko, G. A. Davydov, R. N. Chabdarova, S. A. Vtoryy, A. P. Manik, Yu. A. Spasskiy, Yu. P. Starshinov, and N. M. Utkina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 78-81 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 56-58

Avail: NTIS HC A07/MF A01

It is shown that a 10-day altitude chamber training in an intermittent mode can increase the maximum altitude man tolerates from 8,400 to 9,500 m and maximum time of exposure to increasing hypoxia (from 5,000 m) from 37 to 49 min. The antihypoxic effect of the above training persists for 10 days after its completion, leading to a better oxygen supply to various tissues. Author

**N82-17828#** Joint Publications Research Service, Arlington, Va.

### INFORMATIVENESS OF ULTRASONIC DOPPLER CARDIOGRAPHY IN EVALUATION OF CORONARY CIRCULATION

V. S. Bednenko, V. A. Degtyarev, A. N. Kozlov, N. N. Popov, and G. K. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 82-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 58-61

Avail: NTIS HC A07/MF A01

The use of ultrasonic Doppler cardiography (with respect to the integral values of the signal at systole) to determine efficient coronary circulation was investigated in acute dog experiments (in comparison to the electromagnetic method) and in biophysical models. On the basis of the comparative studies it is concluded that ultrasonic Doppler cardiography can be applied to measure relative changes in the efficient coronary circulation. Author

**N82-17829#** Joint Publications Research Service, Arlington, Va.

### AGE RELATED DISTINCTIONS OF COSMONAUTS REGIONAL HEMODYNAMICS

I. D. Vasilyeva, Kh. Kh. Yerullin, and V. I. Zhuyko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 82-90 ref Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 61-64

Avail: NTIS HC A07/MF A01

Hemodynamics of the large hemispheres of the brain, vertebral basilar system, lungs and legs of 60 cosmonauts aged 30-37 and 38-47, were investigated rheographically. Measurements were made in the morning, under conditions of basal metabolism and in the daytime, before orthostatic tests. Comparison of hemodynamic parameters recorded in the morning and at the daytime and in the two age groups showed significant differences revealing the effects of different factors, first of all psychoemotional tension, on the vasomotor regulation, and greatest resistance of cerebral and pulmonary vascular systems of older cosmonauts to those effects. These investigations emphasize great importance of studies of regional hemodynamics, especially rheoencephalography, not only before provocative tests but also under conditions of basal metabolism. Author

**N82-17830#** Joint Publications Research Service, Arlington, Va.

### COMPARATIVE EVALUATION OF ANTIMICROBIAL ACTIVITY OF SOME URINE PRESERVATIVES

T. Ye. Lebedeva, I. V. Yakimova, N. M. Nazarov, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 91-94 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 64-66

Avail: NTIS HC A07/MF A01

Antiseptics were examined for their antimicrobial activity with respect to the microorganisms that are most likely to occur in the urine subject to prolonged storage. Chlorine and iodine containing compounds were found to have the highest antimicrobial activity combined with a wide spectrum of antimicrobial action. The antimicrobial effect of these compounds was mostly expressed in regard to the typical representatives of urobacteria that actively hydrolyze urea to yield ammonia during prolonged storage of urine. Author

**N82-17831#** Joint Publications Research Service, Arlington, Va.

### RAT AMINO ACID COMPOSITION AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE

T. F. Vlasova, Ye. B. Miroshnikova, T. A. Smirnova, and I. A. Dmitriyeva *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 95-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 66-68

Avail: NTIS HC A07/MF A01

Data concerning the amino acid pool of rats flown onboard Cosmos-1129 and exposed to the ground based synchronous experiment are presented. Certain changes in the amino acid pool of flight and synchronous rats were found. The changes seem to be associated with the selective rate of incorporation of free amino acids into the biosynthetic processes during acute adaptation and with alterations in the protein synthesis rate. J.M.S.

**N82-17832#** Joint Publications Research Service, Arlington, Va.

### MYOCARDIAL PROTEIN FRACTIONS AND ENZYMATIC ACTIVITY THEREOF IN EXPERIMENTAL RATS FLOWN ABOARD COSMOS-936 BIOSATELLITE

R. A. Tigranyan, Ye. A. Nosova, Ye. V. Kolchina, N. A. Veresotskaya, L. M. Kurkina, and N. S. Kolganova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 98-102 refs Transl. into ENGLISH fom Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 68-71

Avail: NTIS HC A07/MF A01

The effect of artificial gravity on protein fractions and their enzyme activity in the myocardium of rats flown onboard Cosmos-936 was studied. In weightless rats the content of sarcoplasmatic proteins increased at R + 0 and that of T fraction proteins decreased at R + 25. In centrifuged rats such changes were not seen. In centrifuged rats the enzyme activity of sarcoplasmatic proteins did not alter. In weightless rats ATPase activity of myosin decreased significantly, and in centrifuged rats it remained almost unchanged. Author

**N82-17833#** Joint Publications Research Service, Arlington, Va.

### METABOLIC PROCESSIS IN RAT SKELETAL MUSCLES AFTER FLIGHT ABOARD COSMOS-936

Ye A. Nosova, N. A. Veresotskaya, Ye. V. Kolchina, L. M. Kurkina, R. A. Belitskaya, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 103-107 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 71-75

Avail: NTIS HC A07/MF A01

The study of skeletal muscles of rats flown on Cosmos-936 demonstrated different metabolic reactions in muscle fibers of different function and type to weightlessness and Earth gravity. The data obtained gave evidence that artificial gravity may considerably prevent metabolic changes in muscles developing in response to specific effects of weightlessness. Author

**N82-17834#** Joint Publications Research Service, Arlington, Va.

### ACTIVITY OF SOME ENZYMES OF CARBONHYDRATE METABOLISM IN RAT SKELETAL MUSCLES AFTER SPACE FLIGHT

V. P. Nesterov, N. A. Veresotskaya, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 p 108-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 75-78

Avail: NTIS HC A07/MF A01

Space flight factors did not influence activity of glycogen phosphorylase and adenylate cyclase in skeletal muscles of rats. Activity of glucose-6-phosphate and 6-phosphogluconate dehydrogenases increased noticeably in the most active muscles (gastrocnemius and tibialis anterior muscles). Activation of enzymes involved in the pentosephosphate pathway of glucose conversion may be associated with compensatory processes induced by muscle changes due to diminished motor activity of animals in space flight. Author

**N82-17835#** Joint Publications Research Service, Arlington, Va.

### ULTRASTRUCTURE OF BLOOD VESSELS AND MUSCLE FIBERS OF RAT SKELETAL MUSCLES AFTER FLIGHTS ABOARD COSMOS-605 AND COSMOS-782 BIOSATELLITES

Z. F. Davik and K. D. Rokhlenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 113-118 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 78-83

Avail: NTIS HC A07/MF A01

Electron microscopy was used to study ultrastructures of the wall of blood vessels and muscle fibers of the red (soleus) and mixed gastrocnemius) muscles of rats flown on Cosmos 605 for 22.5 days and on Cosmos 782 for 19.5 days and sacrificed 4 to 6 hours, 48 hours and 25 to 27 days postflight. It was demonstrated that the orbital flight did not induce significant changes in the ultrastructure of blood vessels of the soleus and gastrocnemius muscles but caused atrophy of muscle fibers and reduction of the number of functioning capillaries. Readaptation of the soleus vascular system to 1 g led to degradation of permeability of capillary and venular walls and development of edema of the perivascular connective tissue. This may be one of the factors responsible for dystrophic changes in muscle fibers. Author

**N82-17836#** Joint Publications Research Service, Arlington, Va.

**BLOOD FIBRINOGEN AS RELATED TO IMMERSION IN WATER FOR SEVEN DAYS AND SHORT-TERM SPACE FLIGHT**

A. N. Fomin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 119-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 83-85

Avail: NTIS HC A07/MF A01

A scrutiny of the literature dealing with hemocoagulation under hypokinetic conditions revealed that blood fibrinogen was studied exclusively in conjunction with other parameters characterizing the blood clotting system. Increase in fibrinogen concentration in blood was demonstrated in individuals submitted to prolonged hypokinesia, patients restricted to bed rest and animals used in experiments with hypokinesia. Blood tests were made on six healthy men before, during, and after seven days of immersion in water as well as cosmonauts before and after seven and four day flights. The microtechnique for measuring the concentration of fibrinogen in blood is based on the phenomenon of heat denaturation of this protein at a temperature of 56 C. Results indicate that the fibrinogen increased during the four to six days of the study. J.M.S.

**N82-17837#** Joint Publications Research Service, Arlington, Va.

**METHOD OF ASSESSING INDIVIDUAL RESISTANCE OF RATS TO HYPOXIC HYPOXIA**

Yu. V. Farber, A. Yu. Grigoryev, and A. I. Yelfimov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 123-125 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 85-86

Avail: NTIS HC A07/MF A01

The question of screening experimental animals according to resistance to hypoxia is addressed in view of the need to investigate individual distinctions with regard to resistance to the body to various extreme factors, including a shortage of oxygen. There are some methodological approaches to the study of this question. In particular, one determines coefficient K as the ratio of rat survival time at an altitude of 12,000 m to restitution time. Experimental data on individual reactions to acute hypoxic hypoxia, which are obtained by determining the time of retention of the postural reflex with a static load are presented. J.M.S.

**N82-17839#** Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

**STUDY OF HOMING PIGEONS IN BRAZIL: SOME PRELIMINARY RESULTS**

R. Ranvaud Oct. 1981 16 p refs Presented at Intern. Symp. on Avian Navigation, Tirrenia, Italy, 14-18 Sep. 1981

(INPE-2248-PRE/032) Avail: NTIS HC A02/MF A01

Observations of vanishing bearings are described. The ability of pigeons to home quite well under some rather unfavorable conditions, namely with the Sun not too far from the zenith and under total overcast in relatively weakly inclined magnetic fields, as well as in cases where the inclination of the magnetic field actually reverses during the flight home is discussed. Homing in regions where the apparent diurnal motion of the Sun's azimuth reverses during the year, the midday Sun being to the north in June and to the south in December, is reported. Homing right across the so called south atlantic anomaly, at which the principal component of the Earth's magnetic field has an absolute minimum, providing a situation in which the gradient of total intensity is zero in all directions, is also reported. T.M.

**N82-17840#** Litton Bionetics, Inc., Kensington, Md.

**MAMMALIAN TOXICOLOGICAL EVALUATION OF DIMP AND DCPD (PHASE 3 - IMPA) Final Report, Dec. 1976 - Apr. 1980**

Francis J. Mecler May 1981 277 p

(Contract DAMD17-77-C-7003; DA Proj. 3E1-62720-A-835)

(AD-A107574) Avail: NTIS HC A13/MF A01 CSCL 06/20

IMPA (Isopropyl Methylphosphonic Acid) had oral LD50's of 7650 and 6070 mg/kg in male and female rats, respectively, and of 5620 and 6550 mg/kg in male and female mice. It was not irritant to rabbit eyes. It was mildly irritant to rabbit skin but produced no systemic toxicity at a dose of 2 mg/kg. IMPA did not induce dermal sensitization in guinea pigs. No evidence of toxicity followed administration of IMPA in the drinking water at levels up to 3000 ppm to rats for 90 days. IMPA was not mutagenic to five strains of Salmonella indicator organisms in the Ames assay both with and without rat liver activation. GRA

**N82-17841#** California Univ., Irvine. Dayton, Ohio.

**RESPIRATORY TOXICOLOGY, 1981 Annual Technical Report, Jun. 1980 - May 1981**

Paul E. Newton Wright-Patterson AFB, Ohio AFAMRL Aug. 1981 46 p refs

(Contract F33615-80-C-0512; AF Proj. 6302)

(AD-A107672; AFAMRL-TR-81-81) Avail: NTIS HC A03/MF A01 CSCL 06/20

The Respiratory Toxicology research programs conducted at the Toxic Hazards Research Unit (THRU), Wright-Patterson Air Force Base by the University of California, Irvine are reviewed in this annual report. Preliminary results are presented of studies concerning: (1) the effect of propylene glycol dinitrate on the cardiovascular system in the dog; (2) the evaluation of pulmonary clearance after exposure to 1.2 ppm of ozone, and (3) the evaluation of small airway test sensitivity in enzyme induced emphysema. Author (GRA)

**N82-17842#** California Univ., Irvine. Dept of Community and Environmental Medicine.

**COMPARATIVE BIOCHEMISTRY AND METABOLISM. PART 2: NAPHTHALENE LUNG TOXICITY Annual Report, Jun. 1980 - May 1981**

Alan R. Buckpitt Wright-Patterson AFB, Ohio Aerospace Medical Research Labs. Oct. 1981 43 p refs

(Contract F33615-80-C-0512; AF Proj. 6302)

(AD-A107673; AFAMRL-TR-81-84) Avail: NTIS HC A03/MF A01 CSCL 06/20

Earlier studies have shown that intraperitoneal administration of naphthalene causes selective pulmonary bronchiolar necrosis in mice and have suggested a role for reactive naphthalene metabolites in the tissue damage. These studies have been extended to show that covalent binding of reactive naphthalene metabolites to tissue macromolecules in lung, liver and kidney is dose-dependent. High levels of covalent binding occur only after tissue glutathione levels are depleted substantially and only at doses of 200 mg/kg and above. The 200 mg/kg dose is the lowest dose at which lung lesions are observed. Piperonyl butoxide pretreatment decreases pulmonary damage and covalent binding and partially blocks glutathione depletion by 400 mg/kg naphthalene. In comparison, SKF 525 A pretreatment decreased covalent binding levels to a much smaller extent and failed to alter glutathione depletion or pulmonary damage after 400 mg/kg naphthalene. When compared to vehicle pretreated controls, phenobarbital or 3-methylcholanthrene pretreatment produced no change in the severity of lung damage after doses of naphthalene ranging from 50 to 400 mg/kg nor did these inducers alter covalent binding at doses of naphthalene of 200 mg/kg or less. Pretreatment of mice with p-xylene preferentially inactivated pulmonary cytochrome p450 and blocked naphthalene induced lung damage but failed to selectively decrease covalent binding of reactive metabolites in the lung. Current studies are continuing to examine the role of cytochrome P450 dependent metabolic activation of naphthalene in the lung in the bronchiolar damage. Author (GRA)

**N82-17843#** Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Abt. Angewandte Physik.

**BIOPHYSICAL FUNDAMENTALS AND INSTRUMENTATION**

**FOR THE ENDOVESICAL Nd:YAG-LASER APPLICATION**
T. Halldorsson 5 Jun. 1981 25 p refs In GERMAN; ENGLISH summary
(MBB-UA-581-81-O) Avail: NTIS HC A02/MF A01

The laser irradiation power needed for tumor therapy was investigated. From considerations of the absorptivity of cellwater and blood as well as the multiple scattering of the radiation and heat conduction in tissue, a theoretical model was developed which enabled an accurate calculation of the temperature distribution up to the denaturation point as well as the percentage of the radiation power lost through backward and forward scattering of light. The theoretical calculations were experimentally verified in animal experiments and measurements on specimens of human bladder tissue performed with a thermocamera. According to the requirements of endoscopic laser therapy, a medical Nd:YAG laser system was developed. For the beam transport into the urinary bladder, flexible light pipes made from thin quartz fibers were used. A.R.H.

**N82-17844#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: LIFE SCIENCES EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 4**
4 Jan. 1982 62 p refs Transl. into ENGLISH of various Russian articles
(JPRS-79780) Copyright. Avail: Issuing Activity

The effects of nonionizing electromagnetic radiation on organisms and tissues are discussed.

**N82-17845#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF COMMERCIAL FREQUENCY ELECTROMAGNETIC FIELD ON ANDROGEN FUNCTION OF RAT TESTS**
A. G. Reznikov and L. V. Tarasenko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 1-5 refs Transl. into ENGLISH from Fiz. Zh. (USSR), v. 27, no. 1, Jan. - Feb. 1981 p 121-124
Avail: Issuing Activity

The biological effects of commercial frequency electromagnetic fields (CFEMF) generated by high voltage electric power lines on the gonads of male rats were investigated. The effect of CFEMF on the endocrine function of rat tests consists of an intensification of steroidogenetic processes and a corresponding increase in the activity of the steroid delta(5)-3 beta-o1 dehydrogenase. No appreciable changes in testosterone levels in peripheral blood plasma were observed following CFEMF irradiation for a period of four months. J.D.H.

**N82-17846#** Joint Publications Research Service, Arlington, Va.
**FEATURES OF METABOLIC DISTURBANCES IN RAT MYOCARDIUM UNDER EFFECT OF ALTERNATING MAGNETIC FIELDS OF DIFFERENT PARAMETERS**
F. A. Kolodub, O. N. Chernysheva, and G. I. Yevtushenko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 6-10 refs Transl. into ENGLISH from Kardiologiya (USSR), v. 21, no. 4, Apr. 1981 p 82-85
Avail: Issuing Activity

The effect of alternating magnetic fields of various voltages and exposures on the metabolism of carbohydrates, macroergic phosphates, and low molecular nitrogen compounds in the rat heart was investigated. The direction and degree of metabolic disturbances in the myocardium after exposure to industrial frequency alternating magnetic fields depend on the voltage of the field and the length of exposure. An alternating magnetic field with a voltage of 32 kA/m delays oxidation and phosphorylation processes without affecting their coupling, and the proportion of oxidized carbohydrates increases as compared with fatty acids. The conversion of carbohydrates and of nitrogen substances are stimulated by an alternating magnetic field with a voltage of 7.5 kA/m. J.D.H.

**N82-17847#** Joint Publications Research Service, Arlington, Va.
**INFLUENCE OF ELECTROMAGNETIC WAVES IN MILLIMETER BAND ON INDUCTOPROTEIN SYNTHESIS OF PENICILLINASE BY STAPHYLOCOCCUS AUREUS**
A. Z. Smolyanskaya, A. M. Makhov, E. A. Gelvich, and M. B. Golant *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 11-16 refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 5, May 1981 p 24-28
Avail: Issuing Activity

The effect of electromagnetic waves in the millimeter band on the synthesis and activity of pencillinase produced by strains of Staphylococcus aureus and Escherichia coli is examined. Experiments demonstrated that wave lengths of 5,478 and 6,466 mm inhibit the induction of the enzyme by St. aureus. However, this type of radiation does not affect the activity of the exoenzyme released from the St. aureus strain, and also does not affect the constitutive synthesis of the penicillinase by E. coli. The relationship of effect of the duration of irradiation, bacterial population, and the strength of current density is elucidated. Author

**N82-17849#** Joint Publications Research Service, Arlington, Va.
**EFFECTS ON BIOLOGICAL SYSTEMS OF ELECTROMAGNETIC OSCILLATIONS IN MILLIMETER RANGE OF WAVELENGTHS**
N. D. Devyatkov, O. V. Betskiy, E. A. Gelvich, M. B. Golant, A. M. Makhov, T. B. Rebrova, L. A. Sevastyanova, and A. Z. Smolyanskaya *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 27-36 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 21, no. 2, Mar. - Apr. 1981 p 163-171
Avail: Issuing Activity

The main patterns of the effects of millimeter radiation of nonthermal intensity on various biological objects are discussed on the molecular, cellular levels, as well as on the level of complex living organisms. The main objects of the studies were hemoglobin and erythrocytes and human blood, E. coli, Staphylococcus aureus, Aspergilla mold, mice and rats. Author

**N82-17850#** Joint Publications Research Service, Arlington, Va.
**CURRENT PROBLEMS OF RADIOBIOLOGY OF ELECTROMAGNETIC RADIATION OF RADIO-FREQUENCY RANGE**

I. G. Akoyev *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 37-43 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 20, no. 1, Jan. - Feb. 1980 p 3-8
Avail: Issuing Activity

On the basis of analysis of the current state of the radiobiology of nonionizing radiation, the need for accelerated development of basic research on the biological action of these radiations, especially in the radio-frequency range, is substantiated. An objective is set for accumulation of experimental data on questions of reversibility and cumulative effects, selectivity, specificity and additivity, direct and indirect action, sensitivity, adaptation and stability in regard to radiation, species differences, and possible mechanisms of operation of radiation. Author

**N82-17851#** Joint Publications Research Service, Arlington, Va.
**PARTICULAR FEATURES OF CONDITIONED ELECTRODEFENSIVE REFLEX IN WHITE RATS ON BACKGROUND OF CONSTANT MAGNETIC FIELD**
I. V. Shust, S. I. Galantyuk, and Yu. V. Cheretyanko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 44-50 refs Transl. into ENGLISH from Fiz. Zh. (USSR), v. 26, no. 2, Mar. - Apr. 1980 p 264-268
Avail: Issuing Activity

The formation of a conditioned electrodefensive reflex in white rats exposed to a 1,000 Oe constant magnetic field was investigated. The influence of the vitamin preparation galascorbin on the formation of the reflex was also studied. The tenacity of the conditioned reflex was reduced by exposure to the CMF, with a greater reduction observed in the initial phase of its development. Changes in conditioned reflex activity were observed during exposure and during the aftereffect period. The threshold of the avoidance reaction initially increased, then decreased, with normalization of the indicator observed until the end of the experiment. Administration of galascorbin promoted tenacious development of the conditioned reflex, which remained more pronounced in the CMF aftereffect period. J.D.H.

**N82-17852#** Joint Publications Research Service, Arlington, Va.

**MORTALITY IN ACUTE MYOCARDIAL INFARCTION AS FUNCTION OF GEOMAGNETIC FIELD ACTIVITY IN YEREVAN**
N. N. Karazyan and L. A. Akhverdyan *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 51-55 Transl. into ENGLISH from Dokl. Akad. Nauk Arm. SSR (USSR), v. 22, no. 3, 1981 p 188-191
Avail: Issuing Activity

The medical history of patients who died from acute myocardial infarction in the city of Yerevan, Armenian SSR, during 1974-1978 was analyzed and compared with records of geomagnetic field activity. The basic causes of death from complications of myocardial infarction were also evaluated. A direct connection was observed between the mortality rate and increased magnetic activity, with men exhibiting a greater sensitivity to high geomagnetic field activity than women. J.D.H.

**N82-17853#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF HYPOGEOMAGNETIC FIELD ON ACTIVITY OF SOME CEREBRAL ENZYMES**
A. V. Shakula and G. M. Chernyakov *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 56-59 refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 9, Sep. 1981 p 11-13
Avail: Issuing Activity

The activity of key brain enzymes of rabbits whose embryonic and early postnatal development occurred during exposure to a hypogeomagnetic field was investigated. The activity of succinate dehydrogenase (SDH), glucose-6-phosphate dehydrogenase (G-6-PDH), tetrazolium oxyreductase (NAD-H), and hexokinase (HK) as determined. Histological examination of neuronal bodies of the cortex, of astroglia and oligodendroglia revealed very high G-6-PDH and NAD-H activity, moderate SDH activity, and mild HK activity. A hypogeomagnetic field was found to be a biologically active factor having an adverse effect on the enzymes regulating energy metabolism. J.D.H.

**N82-17854** Washington Univ., St. Louis, Mo.
**MUSCLE, MOTOR CORTEX, CEREBELLAR NUCLEAR, AND SPINDLE AFFERENT DURING SLOW HOLD-RAMP-HOLD POSITION-TRACKING MOVEMENTS OF THE MONKEY'S WRIST Ph.D. Thesis**
Marc Hudson Schieber 1982 469 p
Avail: Univ. Microfilms Order No. 8122756

Two Rhesus monkeys were trained to perform flexion and extension wrist movements guided by a tracking display. The monkey used a wrist position control to operate a cursor with which he pursued a visual target. The target, and therefore the monkey's wrist, moved in slow hold-ramp-hold (HRH) trajectories. By changing parameters of the target's trajectory, changes were produced in the parameters of the monkey's wrist movement. The second monkey was trained additionally to perform self-spaced alternating wrist movements and to receive occasional pulses of torque about the wrist. It is hypothesized that during slow HRH wrist movements, two parallel motor systems operated in relative dissociation. The first system included class I motor cortex neurons, alpha motoneurons, and extrafusal muscle. The second system included class II motor cortex neurons, nearly all related dentate and interposed neurons, gamma motoneurons, and spindle afferents. This system could have provided for the continuous acquisition of dynamically sensitive spindle afferent feedback constantly maintained in the face of widely varying peripheral conditions. Dissert. Abstr.

**N82-17855** Minnesota Univ., Minneapolis.
**FACILITATED DIFFUSION OF SMALL NON-ELECTROLYTES IN THE HUMAN RED BLOOD CELL**
Robert Ray Mayrand 1981 130 p
Avail: Univ. Microfilms Order No. 8125691

The design of a new simple continuous flow system for the analysis of rates of permeation of small non-electrolytes across human red cell membranes is described. With this system it was demonstrated that ethylene glycol equilibrium exchange is saturable, KM = 175 mM, and inhibitable, glycerol K1 = 1200 mM. Ethylene glycol yielded a permeability coefficient of P sub s = .000336 cm/s. Urea equilibrium exchange was also examined with the continuous flow system. Saturation was again observed, KM = 218 mM. The maximal rate of urea exchange was P sub s = .000808 cm/s. The estimated non-inhibitable (presumably through the lipid) portion of urea equilibrium exchange was .0000258 cm/s which is 3.2 percent of the maximal rate. Dissert. Abstr.

**N82-17856** Columbia Univ., New York.
**TEMPORAL INTEGRATION OF ACOUSTIC POWER FOR INTERRUPTED STIMULI AT SUPRATHRESHOLD LEVELS Ph.D. Thesis**
Joyce Rodriguez-Amblet 1981 132 p
Avail: Univ. Microfilms Order No. 8125375

Threshold and suprathreshold temporal integration data employing experimental variables were investigated. Data were collected to experimental conditions: three stimulus types, nine signal durations and four presentation levels including threshold. Subjects were three normal hearing listener who participated in 20 practice sessions and 12 test sessions of 20 minutes each. Mean threshold and point of subjective equality (PSE) values were calculated for each subject and each experimental condition. It is indicated that the constants of the function are a product of the interaction between stimulus type and intensity as incorporated in a two part linear regression model. It is suggested that critical duration decreases with intensity and is essentially independent of stimulus type at 50 db and 80 dB SPL. The slope of the function varies as a function of intensity and stimulus type, being largest for 1000 Hz and smallest for white noise. These findings are discussed in terms of Zwislocki's exponential theory of loudness summation. Dissert. Abstr.

**N82-17857** Ohio Univ., Athens.
**QUANTIFICATION OF PSYCHOACOUSTIC TUNING CURVE SHARPNESS: AN ANALYSIS OF FREQUENCY RESOLUTION IN CHILDREN AND ADULTS Ph.D. Thesis**
Neal Alan Sloane 1981 120 p
Avail: Univ. Microfilms Order No. 8126067

Probe tone frequencies were pulsed with a rise/fall time of 50 msec., duration of 400 msec., and were delivered at 10 dB SL using a simultaneous masking paradigm. Masked threshold was determined using a modified Hughson-Westlake technique. After the first set of tuning curves was obtained, each subject returned in 24 hours to replicate the test. Results show that the main effect for age is nonsignificant, the main effect for sessions also is nonsignificant, the main effect for frequency is significant, and all possible interactions are nonsignificant. A Tukey Test, calculated for the main effect of frequency, established that all three tuning curves differ significantly from one another in sharpness, it is concluded that within the age range under study, age does not influence tuning curve sharpness. d sub 1 oct. values do not change significantly across experimental sessions, and tuning curves increase significantly in sharpness across probe tone frequencies of 500, 1000, and 2000 Hz. Dissert. Abstr.

**N82-17858** Florida State Univ., Tallahassee.
**A STUDY OF THE ACOUSTIC REFLEX AS ELICITED BY SELECTED ENVIRONMENTAL NOISE STIMULI Ph.D. Thesis**
Marshall Melvin Smith 1981 114 p
Avail: Univ. Microfilms Order No. 8125790

The acoustic reflex thresholds (ARTs) for the environmental noise ranged from 78.83 through 81.78 db SPL. The ARTs for the white noise, and the pure-tone were 81.38 and 95.19 dB SPL, respectively. For all practical purposes (19%) the ARTs for the environmental noises lie within + or - 5 db of the ART for the white noise. The latency at threshold for the environmental noises ranged from 452.5 through 552.50 msec. Similarly, the latencies were 402.5 and 487.5 msec for the white noise and the pure-tone, respectively. The latency at dB SL sub R (20 dB above the threshold) for the environmental noises ranged from 152 through 180 msec. There was a decrease in latency at 20 dB SL sub R compared to that at threshold across all the stimuli. The contraction rate at 20 dB SL sub R for all stimuli ranged from .0008 through .0011 cc/msec. The contraction magnitude at 20 dB SL sub R for all the environmental noises and the white noise ranged from .669 through .816 cc. Dissert. Abstr.

**N82-17859** North Carolina Univ. at Chapel Hill.
**STUDIES ON STRUCTURE AND FUNCTION RELATIONSHIP IN FIBRINOGEN Ph.D. Thesis**
Nadia Aldyth Carrell 1981 160 p
Avail: Univ. Microfilms Order No. 8125561

The literature concerning the chemical properties of fibrinogen and the mechanisms of fibrinogen function was reviewed. The experimental work was aided by the availability of two patients with congenital molecular variants of fibrinogen and one patient with an inhibitor to fibrin polymerization. The fibrinogen level in the first patient was found to be about one third of the normal level by both coagulation and immunologic methods. The second patient had a low plasma level of clotable protein with normal antigen concentration, high amounts of fibrinogen related material in serum, and prolonged thrombin and reptilase clotting times. The third patient developed an inhibitor which markedly prolonged the thrombin and reptilase times of both patient and normal plasmas. A procedure was developed to direct chemical modifications selectively at lysine residues which function in polymerization. An assay to measure the binding of fibrinogen to fixed washed platelets was developed. Dissert. Abstr.

**N82-17860** Florida Univ., Gainesville.
**FORWARD MASKING OF AUDITORY NERVE (N SUB 1) AND BRAINSTEM RESPONSES (WAVE V) IN HUMANS Ph.D. Thesis**
Steven John Kramer 1981 186 p
Avail: Univ. Microfilms Order No. 8127440

The influence of a response to one sound (probe) another sound (masker) when the two sounds occur simultaneously or in a temporal relation was demonstrated. The effects of forward masking on wave-V of the ABR along with N responses recorded simultaneously (on a separate channel) from the ear canal were investigated. Postmasking recovery functions were measured for different masker durations, masker levels, and masker low frequency cutoffs (high-pass masking). The effects on wave-V were different than on N1. The primary effects of forward masking on the probe responses were decreases in N1 amplitude and increases in wave-V latency. Characteristic changes in the recovery functions for variations on masker parameters were found. It is suggested that the relation between wave-V latency and N1 amplitude, along with other characteristics of underlying mechanisms include a recording of the neutral input (N1) within the brainstem pathways generating the wave-V potential. Dissert. Abstr.

**N82-17861** Ohio Univ., Athens.
**HUMAN AUDITORY BRAINSTEM ELECTRIC RESPONSES TO BINAURAL AND MONAURAL STIMULI Ph.D. Thesis**
Paul Alfred Lobaugh 1981 149 p
Avail: Univ. Microfilms Order No. 8126058

The auditory brainstem electric response (ABER) is recorded from electrodes attached to the scalp of humans and consists of a series of sub-microvolt peaks which occur in the 10 ms period following presentation of simple auditory stimuli such as clicks. The ABER differences due to binaural and monaural stimulation which are defined as binaural interaction are investigated. It is also possible that binaural signal processing, if reflected by the ABER, may occur in an asymmetric manner. The effects of a stimulus variable, click polarity, and a subject variable, headsize, upon the ABER are studied. Click-evoked ABERs were acquired from 44 normally hearing adolescent and adult subjects. Responses to binaural and monaural stimulation were analyzed. It is concluded that polarity of the stimulus does not affect ABERs in response to 60 and 70 dB SL clicks. For 80 dB SL stimulation, negative polarity clicks evoke shorter latency waves than do positive polarity clicks. Dissert. Abstr.

**N82-17862*#** Nerco Scientific, Houston, Tex.
**PORTABLE MEDICAL STATUS AND TREATMENT SYSTEM Final Report**
Dec. 1981 25 p
(Contract NAS9-15821)
(NASA-CR-167486) Avail: NTIS HC A02/MF A01 CSCL 06E

A portable medical status and treatment system is discussed. The vital signs monitor includes electrocardiogram, respiration, temperature, blood pressure, alarm, and power subsystems, which are described. A DC defibrillator module, a radio module, and their packaging are also described. These subsystems were evaluated and the results and recommendations are presented. S.L.

**N82-17863#** Institute of Human Performance, Fairfax, Va.
**PHYSICAL PERFORMANCE TASKS REQUIRED OF U. S. MARINES OPERATING IN A DESERT ENVIRONMENT**
Paul O. Davis, Arthur V. Curtis, Jr., and Steven A. Bisby Nov. 1981 62 p refs
(Contract N00014-80-C-0473)
(AD-A107866; TR-7) Avail: NTIS HC A04/MF A01 CSCL 15/7

Nine representatives of the Institute of Human Performance were integrated into a marine battalion during a CAX (combined arms exercise) for the purpose of gathering descriptive and objective information regarding the nature and types of physical performance tasks encountered by marine infantrymen (MOS 0311) during desert combat. Through the use of minicassette recorders, scales, cameras and other data collection equipment, scenarios were described which typify the critical, frequent and strenuous types of tasks indigenous to marines in this environment. Distances covered on foot, loads carried, rates of travel and grades encountered are detailed and described as well as other environmental overlays which impact on troop performance. It was determined that for the most part, a mechanized, motorized combat scenario does not require high levels of physical ability; however, fire team rushes represent a critical scenario, with high levels of aerobic and anaerobic power, particularly when performed in ambient temperatures of 100-107 F. A taxonomy of physical tasks from this environment will be added to physical performance data from other Marine Corps theaters of operations for the purpose of developing a complete job analysis of activities involving strength and endurance factors. Author (GRA)

**N82-17864#** California Univ., Irvine. Dept. of Community and Environmental Medicine.
**CYTOLOGIC AND BIOCHEMICAL GENETIC EFFECTS OF CHEMICAL CARCINOGENS Annual Report, 1 Jul. 1980 - 30 Jun. 1981**
Ronald E. Rasmussen Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Oct. 1981 43 p refs
(Contract F33615-80-C-0512; AF Proj. 6302)
(AD-A107615; AFAMRL-TR-81-82) Avail: NTIS HC A03/MF A01 CSCL 06/20

The first project is concerned with the relationship between initiation of cancer by chemicals and the damage and repair of DNA in cells and tissues susceptible to the carcinogenic action of the chemicals. The working hypothesis is that interaction of the carcinogen with cellular DNA is a necessary step in carcinogenesis and that this interaction may cause DNA damage which is then followed by DNA repair synthesis. The second project was conducted with the cooperation of the staff of the Toxic Hazards Research Unit at AMRL, WPAFB. Rats and hamsters were exposed by inhalation to hydrazine at 750 ppm for one hour. Groups of animals which had been exposed only once or which had been exposed 10 times were shipped to UC Irvine for study. The factors studied were (1) DNA replication in the lung; (2) DNA repair synthesis in the lung; (3) Cellular replication in the lung and nasal turbinates; and (4) Metabolism of a known lung carcinogen, 3H-benzo(a)pyrene, by lung slices from the treated animals. The third project was initiated during the current year with the goal of developing an animal model in which biochemical and cytogenetic factors could be studied during the process of tumorigenesis. Range-finding studies are underway at the Toxic Hazards Research Unit (THRU) to establish the intratracheal dosage of 3-methylcholanthrene (MCA) necessary to produce a high yield of lung tumors in Fischer 344 rats within 12 months. GRA

**N82-17865#** California Univ., Irvine. Dept. of Community and Environmental Medicine.
**COMPARATIVE BIOCHEMISTRY AND METABOLISM. PART 1: CARCINOGENESIS Annual Report, Jun. 1980 - May 1981**
Robert C. Shank Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Oct. 1981 38 p refs
(Contract F33615-80-C-0512; AF Proj. 6302)
(AD-A107614; AFAMRL-TR-81-83-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 06/20

Oral administration of the inorganic hepatotoxin, hydrazine, to male Fischer 344 or Sprague Dawley rats results in the endogenous methylation of liver DNA at the 7- and O6-positions of guanine. At doses below the LD50 (45, 60 or 75 mg hydrazine/kg body weight), methylation levels varied little and averaged about 500 micromol 7-methylguanine/mol guanine and 20 micromol O6-methylguanine/mol guanine. At 90 mg hydrazine/kg body weight (approximately the 7-day LD50) the

methylation levels were 869 micromol 7-methylguanine and 58 micromol O6-methylguanine/mol guanine 24 hours after toxicant administration. A single dose of 3 mg hydrazine/kg body weight did not result in detectable levels of methylguanines in liver DNA; however, after three or four daily administrations of hydrazine at this dose, liver damage was evident, and liver DNA contained 50-100 micromol 7-methylguanine/mol guanine, about the limit of analytical detection. Following a single oral administration of 90 mg hydrazine/kg body weight, liver DNA guanine rapidly became methylated. The time for half-maximum alkylation at 7-guanine was 30 minutes and at O6-guanine, 45 minutes. The rates of removal of these methylated bases were consistent with published values from experiments using methylating carcinogens and with values obtained in this laboratory with the model compound, 1,2-dimethylhydrazine.
GRA

**N82-17866#** Environmental Protection Agency, Ann Arbor, Mich. Inspection and Maintenance Staff.
**HEALTH EFFECTS OF CARBON MONOXIDE AND OZONE**
Jul. 1981 20 p refs Prepared in cooperation with Energy and Environmental Analysis, Inc., Arlington, Va.
(PB82-114265; EPA-AA-IMS-81-8) Avail: NTIS HC A02/MF A01 CSCL 06T

The information known about the health effects of carbon monoxide (CO) and ozone (O3) is summarized. How that information is used by EPA to set National Ambient Air Quality Standards is discussed. The sources most likely to contribute to high levels of CO and O3 and how EPA control programs will reduce emissions from these sources in the future are discussed. The health effects on humans and plants are discussed.
Author (GRA)

**N82-17867** American Univ., Washington, D. C.
**A MODEL FOR ESSENTIAL HYPERTENSION: METABOLIC STUDIES Ph.D. Thesis**
James Patterson Church 1981 101 p
Avail: Univ. Microfilms Order No. 8126862

The extent to which blood pressures and tissue lipid levels are manipulated by dietary control of low levels of essential fatty acids in rat strains used as models of hypertensive and normotensive man were determined. Procedures included gravimetric total lipids, colorimetric cholesterol and phospholipids, fluorimetric triglycerides and gas liquid chromatographic fatty acids. Samples were taken from plasma liver and kidney. Total lipids were lower in plasma, liver, and kidney of the SHR than the WKY. Liver triglyceride and kidney cholesterol and phospholipid (PL) were lower with liver PL higher in SHR than in WKY. Total individual fatty acids in plasma and in neutral lipid and PL fractions of liver and kidney exhibited several strain and diet differences. A high metabolic rate in the SHR suggests defective transport of essential fatty acids from the liver. Dissert. Abstr.

**N82-17868** California Univ., San Diego.
**CEREBRAL HEMISPHERIC ACTIVITY AND AUTOMONIC NERVOUS FUNCTION Ph.D. Thesis**
Deborah Ann Werntz 1981 130 p
Avail: Univ. Microfilms Order No. 8125444

An otherwise unknown relationship between cerebral hemispheric activity, as exhibited by the EEG, and the autonomic nervous system as exhibited by the nasal cycle and its self-induced alteration as regulated by forced uninostril respiration is demonstrated. It is proposed that the correlation of the nasal cycle with alternating relative EEG amplitude asymmetry is indicative of and consistent with a single ultradian ocillator system. It is also proposed that the nasal cycle is controlled via a central mechanism, whereby the hypothalamus regulates the sympathetic/parasympathetic balance and the vasomotor tone throughout the body. The 'feedback' effect of nasal airflow on EEG asymmetry is mediated through the olfactory system and its connecting pathways to the hypothalamus. The data demonstrate the individual's ability to noninvasively and predictably alter cortical activity and possibly other autonomic functions. Dissert. Abstr.

**N82-17869** Michigan State Univ., East Lansing.
**THE ROLE OF INTESTINAL NERVES IN THE NUTRIENT INDUCED INTESTINAL HYPEREMIA Ph.D. Thesis**
Richard Arlan Nyhof 1981 124 p
Avail: Univ. Microfilms Order No. 8126536

The blood flow to the small intestine increases following a meal, and this hyperemia appears to be localized to those portions of the intestine exposed to nutrients. Evidence indicates that local intestinal nerves may participate in producing this hyperemia. The venous outflow of isolated canine jejunal segments, the arteriovenous oxygen difference, and the rate of oxygen consumption were measured before and after administration of a local anesthetic and several neurotransmitter antagonists. Intestinal nerves do not appear to play a role in the intestinal hyperemia produced by luminal placement of nutrient solutions. On the basis of the magnitude of hyperemic and metabolic responses, the hyperemia produced by glucose appears to be metabolically mediated. The oleic acid induced hyperemia more closely resembles that produced by vasodilator chemicals. The hyperemia produced by food would likely involve a combination of these mechanisms. Dissert. Abstr.

**N82-17870** Yale Univ., New Haven, Conn.
**REGULATION OF CALCIUM CURRENT AND CALCIUM ACTIVITY IN HEART CELLS Ph.D. Thesis**
Eduardo Marban 1981 152 p
Avail: Univ. Microfilms Order No. 8125689

The regulation of calcium current in mammalian ventricular muscle and Purkinje fibers was studied by voltage clamp technique. The effects of changes in intracellular calcium on the size of the slow inward calcium current (I sub si) were found to explain the digitalis-induced increase in this current, as well as some properties of the inactivation of I sub si. The involvement of K+ as a charge carrier of the transient outward current is shown Ca entry leads to inactivation, as previously suggested for Paramecium, Aplysia neurons, and stick insect skeletal muscle. Enhancement of I sub si is observed in association with the positive inotropic effect of digitalis. It is suggested that a rise in Na sub I leads to increased I sub si possibly through a secondary rise in Ca. Quiescent ventricular muscle, a mean free Ca2+ concentration of micro is found. During contractures, transients rising up to 10 micro are reported. In studying the effects of catecholamines on free Ca2+ and force, it is evidenced that epinephrine reduces myofibrillar Ca2+ sensitivity in heart muscle. Dissert. Abstr.

**N82-17871*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**AN EVALUATION OF HELICOPTER NOISE AND VIBRATION RIDE QUALITIES CRITERIA**
C. E. Hammond, D. D. Hollenbaugh, S. A. Clevenson, and J. D. Leatherwood Dec. 1981 14 p refs Presented at the Technol. for the Jet Smooth Ride, A Natl. Specialists' Meeting on Helicopter Vibration, Hartford, Conn., 2-4 Nov. 1981; sponsored by the American Helicopter Society Prepared in cooperation with Army Research and Technology Lab., Fort Eustis, Va.
(NASA-TM-83251) Avail: NTIS HC A02/MF A01 CSCL 05H

Two methods of quantifying helicopter ride quality; absorbed power for vibration only and the NASA ride comfort model for both noise and vibration are discussed. Noise and vibration measurements were obtained on five operational US Army helicopters. The data were converted to both absorbed power and DISC's (discomfort units used in the NASA model) for specific helicopter flight conditions. Both models indicate considerable variation in ride quality between the five helicopters and between flight conditions within each helicopter. T.M.

**N82-17872*#** Singer Co., Sunnyvale, Calif.
**VTOL/STOL VISUAL STUDY Final Report**
Frank P. Lewandowski Jun. 1980 38 p
(Contract NAS2-10222)
(NASA-CR-166292) Avail: NTIS HC A03/MF A01 CSCL 05I

The development of data bases and real time techniques to improve the realism of sea state, bow and stern wake, and ship motion is addressed. This system was designed for use with the Vertical Motion Simulator to perform basic studies on VTOL/STOL aircraft. B.W.

**N82-17873#** Dunlap and Associates, Inc., La Jolla, Calif.
**DEVELOPMENT OF THE AUTOMATED PERFORMANCE ASSESSMENT AND REMEDIAL TRAINING SYSTEM (APARTS): A LANDING SIGNAL OFFICER TRAINING AID Final Report, Sep. 1979 - Mar. 1981**
Steven T. Breidenbach and Clyde A. Brictson Orlando, Fla. Naval Training Equipment Center Jun. 1981 53 p refs
(Contract N61339-79-D-0105)
(AD-A106224; NAVTRAEQUIPC-79-D-0105-1) Avail: NTIS HC A04/MF A01 CSCL 05/9

**N82-17874**

Development of the automated performance assessment and remedial training system (APARTS) is described. The APARTS is an automated training aid designed to assist the landing signal officer (LSO) in training pilots during the acquisition of carrier landing skills. The APARTS is based on general principles of learning and provides graphic displays of pilot landing technique problems for LSO evaluation and pilot feedback. The APARTS also integrates field carrier landing practice, conducted in the aircraft, with night carrier landing training (NCLT) instruction. Once landing problems are identified and feedback is provided to the pilot, remedial instruction is given in the NCLT. An improved APARTS conceptual model along with two computer programs designed to process, store and graphically display pilot performance data are described. Future APARTS developments are outlined for improved carrier landing effectiveness. GRA

**N82-17874*#** Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.

### TIME DOMAIN IDENTIFICATION OF AN OPTIMAL CONTROL PILOT MODEL WITH EMPHASIS ON THE OBJECTIVE FUNCTION

David K. Schmidt 1982 22 p refs Presented at AFFTC/NASA Dryden/AIAA Workshop on Flight Testing to Identify Pilot Workload and Pilot Dynamics, Edwards, Calif., 19-21 Jan. 1981 (Grant NAG4-1)

(NASA-CR-168487) Avail: NTIS HC A02/MF A01 CSCL 05H

A method for the identification of the pilot's control compensation using time domain techniques is proposed. From this information we hope to infer a quadratic cost function, supported by the data, that represents a reasonable expression for the pilot's control objective in the task being performed, or an inferred piloting strategy. The objectives for this method are: (1) obtain a better understanding of the fundamental piloting techniques in complex tasks, such as landing approach; (2) the development of a metric measuurable in simulations and flight test that correlate with subjective pilot opinion; and (3) to further validate pilot models and pilot vehicle analysis methods. E.A.K.

**N82-17875*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

### HUMAN-MACHINE INTERFACE ISSUES IN THE MULTI-SATELLITE OPERATIONS CONTROL CENTER-1 (MSOCC-1) Technical Memorandum, 1 Jun. - 7 Aug. 1981

Christine M. Mitchell (George Mason Univ.) Aug. 1981 68 p refs

(NASA-TM-83826) Avail: NTIS HC A04/MF A01 CSCL 05H

An analysis of the Multisatellite Operations Control Center facilities (MSOCC-1) is presented. The analysis focuses on the human machine interfaces and interactions present in the data operations control area, the computer support operations, and the mission operations rooms in both current facilities and the proposed automated MSOCC-1. An alternative approach to the design of the automated MSOCC-1, which highlights human factors and human machine interaction dimensions of the design process, is also presented. S.L.

**N82-17876#** Federal Aviation Administration, Washington, D.C.

### DOT/FAA HUMAN FACTORS WORKSHOP ON AVIATION. TRANSCRIPT, VOL 1

Nov. 1980 112 p Workshop held at Cambridge, Mass., 24-25 Nov. 1980 2 Vol.

(AD-A107802) Avail: NTIS HC A06/MF A01 CSCL 01/2

The opinions of airline pilots are considered in a presentation of aviation human factors safety issues. Human behavior is considered in the design, operation, and maintenance of aviation man machine systems. GRA

**N82-17877#** Federal Aviation Administration, Washington, D.C.

### DOT/FAA HUMAN FACTORS WORKSHOP ON AVIATION. TRANSCRIPT, VOLUME 2

25 Nov. 1980 219 p refs Workshop held at Cambridge, Mass., 24-25 Nov. 1980

(AD-A107803) Avail: NTIS HC A10/MF A01 CSCL 01/2

Training issues and flight fatigue are considered in a presentation of aviation human factors safety issues. Human behavior is considered in the design, operation, and maintenance of aviation man machine systems. GRA

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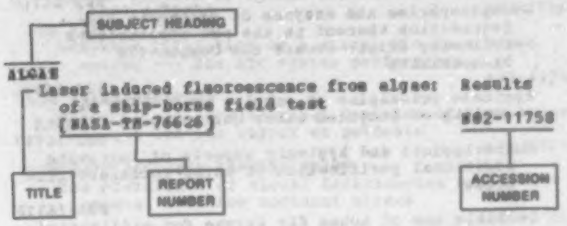

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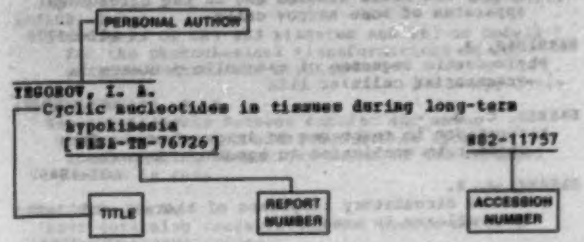

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 233)

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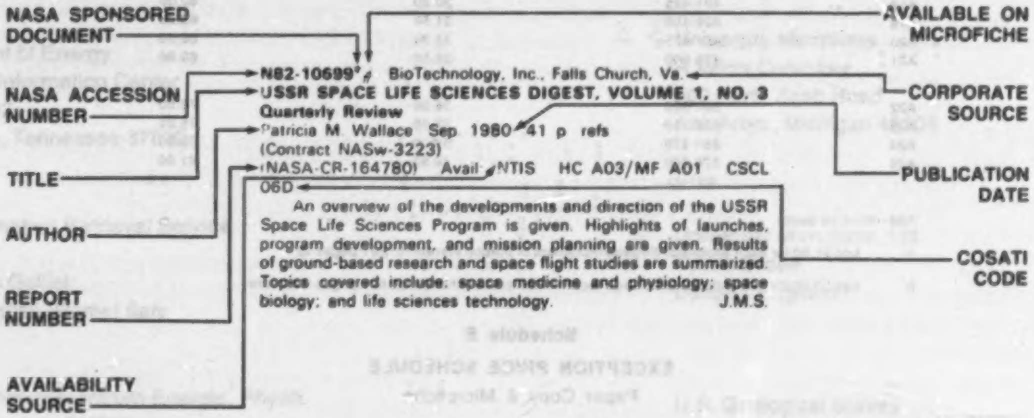
## TYPICAL CITATION AND ABSTRACT FROM *STAR*



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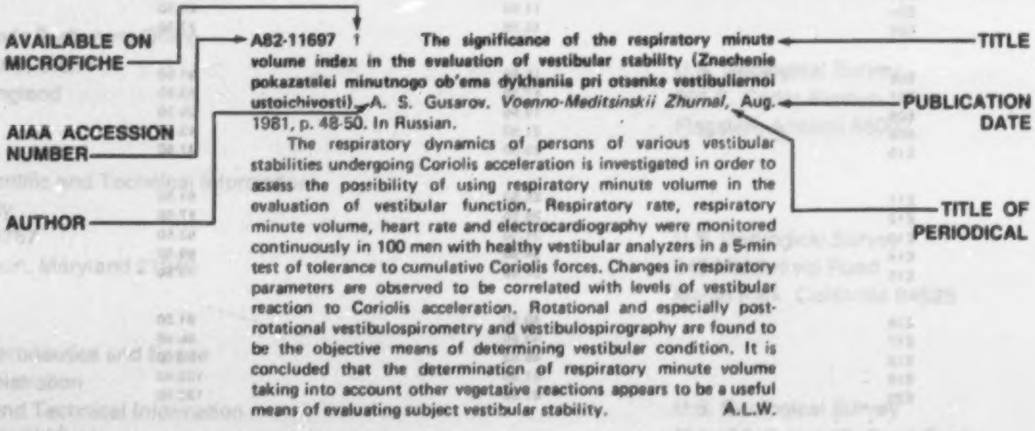
**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3**
**Quarterly Review**
Patricia M. Wallace Sep. 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

## TYPICAL CITATION AND ABSTRACT FROM *IAA*



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**A82-11697 #** **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## A Continuing Bibliography (Suppl. 233)

JUNE 1982

## IAA ENTRIES

**A82-22400** 1 **Respiratory regulation (Reguliatsiia dykhaniia).** I. S. Breslav and V. D. Glebovskii. Leningrad, Izdatel'stvo Nauka, 1981. 280 p. 1140 refs. In Russian.

The mechanism of respiratory regulation is considered: the central and peripheral organs which play a part in the respiration process are described, including the respiratory muscles and their related efferent tracts and the bulbar respiratory neural centers. The functions of the receptors, responsible for the regulation of breathing are described in detail: the mechanoreceptors of the lungs and the respiratory tracts as well as the arterial and medullary chemoreceptors. Modern theories on the self-regulation of the rate and depth of breathing and/or the regulation of pulmonary ventilation under muscular activity and additional resistance to breathing are presented. Particular attention is given to the human respiratory system, and clinical cases of the mechanisms are cited. J.F.

**A82-22435** **Microwave and radio-frequency exposure limits.** F. Harlen (National Radiographical Protection Board, Didcot, Oxon, England). *IEE Proceedings, Part A - Physical Science, Measurement and Instrumentation, Management and Education, Reviews*, vol. 128, pt. A, no. 9, Dec. 1981, p. 589-592. 16 refs.

The paper summarizes the exposure limits that have been promulgated by national organizations of different countries, and the rationales that have been advanced for establishing these limits. The limits differ by orders of magnitude, largely because of different philosophical approaches to standard making. The limits were developed, in the first instance, because of concern about high-power radar equipment, but have gradually been extended to cover very much lower frequencies. New standards are being developed in the USA which are much more restrictive as regards RF exposure. The justification for these is examined. (Author)

**A82-22901** **Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.** Edited by G. E. Corrick, E. C. Haseltine, and R. T. Durst, Jr. Santa Monica, CA, Human Factors Society, Inc., 1980. 694 p. Members, $15.; nonmembers, $20.

Progress in human factors engineering, design, and research were covered in topics such as aircraft displays, anthropometry, automation, control design, and situations which demand decision making and problem solving. Attention was also given to human-computer interfaces, designing for the handicapped, for nuclear power plants, for eye safety, and for driver performance and safety. Flight skill maintenance and human-computer communication were discussed, as were space systems involving the Shuttle, effects of living environments, workload studies, and perception and attention studies. Performance evaluation was reviewed, along with the effects of heat stress on human performance, applications of crew station simulation, task taxonomies, the research philosophy of human factors studies, and signal detection. Finally, target acquisition was investigated, and studies of testing and evaluation, training, stress, and visual performance were presented. M.S.K.

**A82-22903** **Findings from a study of tactical symbology for fighter aircraft displays.** C. J. Kopala (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 9-12.

Pilot flight performance and symbol recognition performance using a proposed symbology set for a fighter aircraft real-time combat situation display were measured. Significant performance differences attributed to the individual symbol types (aircraft, surface-to-air missiles, and anti-aircraft artillery) and symbol states (hostile, unknown, and friendly) are discussed. (Author)

**A82-22904** **A case for early objective evaluation of candidate display formats.** S. Herron (Bunker Ramo Corp., Electronic Systems Div., Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 13-16. Contract No. F33615-78-C-3814.

The development and subsequent evaluation of a candidate head-up display (HUD) symbology set is described as an example of the importance of early evaluation of a candidate display format. HUD allows the pilot to view the outside scene while flying an approach or firing a weapon with little or no reference to other instrumentation. The establishment of standardized HUD symbology for all flight modes is considered essential to enable a pilot to shift orientations to different demanding scenarios such as air-to-air to air-to-ground combat situations rapidly. Eighteen A-7D pilots were employed to test simulations with A-7 HUD displays and the standardized format displays. After two trials with reconfigured HUD symbology, favorable pilot opinions of the proposed HUD symbols were garnered with poor performance results, indicating that further symbology development is required. M.S.K.

**A82-22906** * # **What do pilots see in displays.** R. L. Harris, Sr. and D. M. Christhilf (NASA, Langley Research Center, Hampton, VA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 22-26. Abridged.

Based on pilots' scanning data and discussions with pilots, general aviation flight instruments have been classified into three categories. The classification is related to the type of information presented, the way the information is used, and the pilot's role as a monitor and controller. Suggestions are made for modifying the instruments of one category to improve the information displayed such that when monitoring, the pilot can more quickly extract the information needed. (Author)

**A82-22907** **A strength and anthropometric comparison of young men and women.** W. W. Hosler (U.S. Army, Electronic Proving Ground, Sierra Vista, AZ) and J. R. Morrow (Houston, University, Houston, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 31-33. 14 refs.

Isokinetic strength and anthropometric differences between men and women were examined for applications in work station design. Randomly selected groups of 85 college students were tested for arm and leg strength in maximal and submaximal trials, and variables such as sitting height, arm length, biacromial diameter, biiliac diameter, three skinfolds, age, and body fat percentages were recorded. Men were found to have a greater lean body mass and less body fat, while anthropometric variables such as shoulder and hip diameter were less significant. Due to the larger isokinetic body strengths displayed by males, it is recommended that women benefit from the technology of force transducers, such as those required for rapidly removing themselves from emergency situations. Men were also found to be more suited for moving objects and themselves. M.S.K.

A82-22908 **Evaluating operator performance on automated tactical systems.** C. W. Howard and B. H. Taylor (U.S. Army, Research Institute for the Behavioral and Social Sciences, El Paso, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 41-43.

The U.S. Army's Patriot missile system features many advanced automated capabilities. The sophistication of this system raises the possibility that human intervention will actually degrade its performance. Efforts are underway to develop a performance measure that may be used to gauge these effects. A tentative measure has been derived and is currently being validated and refined. Present and future applications for such a metric are discussed. (Author)

A82-22909 **Mini-remotely piloted vehicle precision tracking evaluation.** D. C. Fulkerson, M. L. Hershberger, and L. A. Scanlan (Hughes Aircraft Co., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 44-48. Grant No. DAAB07-78-C-2415.

The research reported assessed the ability of a human operator to manually null the residual pointing errors that remain on the output of an automatic target tracker under conditions of data link bandwidth reduction. Three operator performance evaluations were conducted using a hybrid computer simulation of the mini-RPV system. The first study assessed the ability of an operator to null the residual errors using a baseline system design. In the study, 32 combinations of environmental and display factors were examined to determine their impact on pointing accuracy. In no case did the average performance reach the 50 microradian standard deviation criterion. The remaining two studies evaluated candidate modifications to the mini-RPV system which would be expected to improve overall tracking performance. Based on these studies, a modified system was identified which allowed criterion tracking accuracy while yielding a 32-to-1 reduction in the data link bandwidth. (Author)

A82-22910 **Computer assisted displays enabling internalization and reduction of operator workload in higher order systems, or, pushing the barrier of human control beyond second order systems.** R. Eberts and W. Schneider (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 59-62. 8 refs.

The design of computer generated displays which allow an operator to respond to higher than second order control system requirements without conscious control reasoning is discussed. Displays are intended to relate appropriate symbology for an intuitive grasp of the situation, with the resultant response coming automatically from thorough training which supplied an unconsciously operating skill. A consistent response to control stimuli is necessary, with time representations changing with the number of dimensions which are to be controlled. The development and implementation of forward-backward display with velocity cues involves the establishment of an internal model within the operator. Factors which have inhibited the development of effective predictor displays are the lack of necessary algorithms, too many unpredictable variables in the flight of a vehicle, and the presence of overly complex and unpredictable environments for some aircraft. M.S.K.

A82-22911 **Computer simulations for fault diagnosis training - From simulation to live system performance.** W. B. Johnson and W. B. Rouse (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 69-73. 10 refs. Contract No. MDA903-79-C-0421.

Three methods of training for fault diagnosis were studied: traditional instruction, context-specific computer simulations, and context-free simulations. Each of thirty-six powerplant maintenance trainees were trained with one of these methods, and then, transferred to real aircraft powerplants and, later, to simulations of an auto-pilot system. For the aircraft powerplants, it was found that traditional instruction was only superior if explicit demonstrations were provided for the exact failures to be encountered. With respect to overall performance, context-free training did not produce improved performance on the unfamiliar auto-pilot system. Considering correlates of live system performance, it was found that performance in the context-free simulation was a good predictor, while performance in the context-specific simulations was by no means useful. Trainee Grade Point Averages and scores on traditional quizzes were also highly correlated with live system performance. (Author)

A82-22912 **Design criteria for decision aids - The users perspective.** R. R. Mackie (Human Factors Research, Inc., Goleta, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p.80-84. 8 refs.

The opinions of over 200 Navy personnel serving aboard ASW aircraft, surface ships and submarines were solicited to identify factors that will influence acceptance and use of a wide variety of computer-generated decision aids designed to assist mission planning, search procedures, target detection, classification, localization, and attack. User concerns about the design and use of decision aids are described and some recommendations for addressing those concerns are made. (Author)

A82-22913 **Low-level laser light effects - Long-term effects.** H. Zwick, B. E. Stuck, and E. S. Beatrice (U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 152-156. 13 refs.

Attempts to correlate ultrastructural alterations with function changes are described for tests involving the exposure of behaviorally trained Rhesus monkeys to low-level laser light. Two optically undamaged monkeys were secured in a box with their heads positioned to view rear-projected Landolt and gapless rings at various wavelengths to determine log threshold background intensities required for the discrimination of specific acuity criterion at each wavelength. Each animal received a total of 38 hr exposure, and depressed photopic function was observed with prolonged, repetitive viewing of laser light at 514.5 nm. The performance decrement was found to be possibly cumulative, from evidence of lessened acuity between the end of one test and the beginning of another. Caution is advised, along with frequency surveillance of visual function, in any situation requiring exposure to repetitive low-level laser light. M.S.K.

A82-22914 **Changes in spectral acuity following laser irradiation.** D. O. Robbins, H. Zwick, and M. Haenlein (Ohio Wesleyan University, Delaware, OH; U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 162-166. 5 refs.

Measurements of the immediate recovery of visual acuity and the long-term consequences of repeated exposures to HeNe, Kr, and A laser light at low levels are reported from tests with Rhesus monkeys. Beam diameters between 150-323 microns were shone on the corneas of monkeys whose heads were held in a fixed position, with power levels of 0.3-11 mW at the cornea. The recovery of acuity was measured with both achromatic and chromatic backgrounds for Landolt rings immediately after exposure. Failure to regain acuity resulted in a removal from exposure and continuous monitoring of spectral and white light acuity. Effects were found to be dependent on the wavelength of the laser source, and all subjects showed degradation of acuity in the short wavelength regions two months after the tests. It is suggested that specific spectral lines of coherent light at low levels selectively alter specific foveal cone processes. M.S.K.

**A82-22915** **Flying skill maintenance.** E. E. Eddowes, J. C. DeMaio (USAF, Human Resources Laboratory, Williams AFB, AZ), J. L. Eubanks, D. R. Lyon, T. H. Killion, and R. T. Nullmeyer (Dayton, University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 167, 168.

The results of tests with fighter pilots and bomber crews to determine the skills required for combat tasks and the levels of training to maintain those skills are reported. The fighter pilot skills were found to be planning, information processing, discriminating, anticipating, deciding, controlling, concentrating, remembering, and integrating during air-to-surface, air-to-air, and tactical formation tasks. Strategic bombing skills have been focussed on low-level bombing runs, with specific attention to the tasks of the radar navigator and the electronic warfare officer. Additional data have been gathered for Commander and Copilot performance in landing and inflight fueling operations. The results of the subjective and objective tests are being used to prepare training simulator programs for minicomputers and as testing data for separating skilled from less skilled pilots. M.S.K.

**A82-22916** **Voice entry for reducing pilot workload.** S. J. Mountford and R. A. North (Honeywell Systems and Research Center, Minneapolis, MN). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 185-188.

An experiment was conducted to assess the potential improvement in operator performance when data entry is performed by voice input over keyboard input. In a workload condition simulating manual/visual time sharing of two tasks (tracking and radio channel changing) performance on both tasks are significantly improved when operators switched to voice input for the data entry task. Results are discussed in light of the potential of voice recognition systems for the future fighter cockpit. (Author)

**A82-22918 *** **The assembly of large structures in space - An evaluation of hardware configurations and assembly techniques through neutral buoyancy simulation.** T. E. Loughead and E. C. Pruett (Essex Corp., Huntsville, AL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 205-208. Contract No. NAS8-32989.

The implementation of NASA's Space Transportation System (STS) presents the opportunity for the on-orbit assembly of structures which, before the advent of multi-launch missions, were not possible because of their physical size. This report presents the results of an eight-month effort in the investigation of assembly techniques and hardware configurations used in assembly of the basic tetrahedral cell by A7LB pressure-suited subjects in Marshall Space Flight Center's Neutral Buoyancy Simulator. Eleven subjects participated in assembly procedures which investigated two types of structural members and two configurations of attachment hardware. The assembly was accomplished through extra-vehicular activity (EVA) only, EVA with simulated manned maneuvering unit (MMU), and EVA with simulated MMU and simulated remote manipulator system (RMS). Assembly times as low as 10.20 minutes per tetrahedron were achieved. (Author)

**A82-22921** **The effects of noise - A review.** V. J. Gawron (Illiana Aviation Sciences, Ltd., Las Cruces, NM). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 233-237. 41 refs. NSF Grant No. DAR-78-12722.

Research on the effects of noise on human performance is reviewed. Instructing subjects of the favorable, unfavorable, or lack of effect by noise has been shown to not affect the level of performance, while high levels of noise have been observed to cause a degradation in the repetition of digits or syllables. The performance of complex tasks involving either mental agility, skill, speed, complex psychomotor activity, or a high level of perceptual capacity was found to degrade in the presence of noise while simple tasks did not. The effects of noise on the complex tasks was found to display a continuous lowering of performance, and no correlations with sound intensity have been found. Results have been contradictory, and the employment of multivariate analyses is recommended as a means to achieve a compromise among contending conclusions. M.S.K.

**A82-22922** **The measurement of aircrew task loading during operational flights.** D. Gunning (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 249-252. 6 refs.

In-flight observers collected task loading data during four operational flights of the Air Force's KC-135 tanker aircraft. The data were collected via a Datamyte Data Recorder which the observers used to record the occurrences of 45 different tasks performed by the pilot, copilot, and navigator. Examples of the task loading data are presented including workload profiles for each crewmember, peak workload situations, and usage data for individual aircraft systems. (Author)

**A82-22923** **The structure of processing resources - Implications for task configuration and workload.** C. Wickens, W. Derrick, D. Berringer, and J. Micalizzi (Illinois, University, Champaign, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 253-256. 7 refs. Contract No. N00014-79-C-0658.

A series of experiments to validate a three-dimensional model of processing resources are outlined. The model comprises processing stages, which include perceptual and central processing as opposed to response selection and execution, processing modalities, which are visual inputs and manual responses as opposed to auditory inputs and vocal response, and processing codes, which consider verbal as opposed to spatial modes. Subjects were exposed to trials of selected symbols which were or were not included in a previously observed set, and which were manipulated for orthogonal position on the screen, in accordance with principles of Sternberg tasks. The trials were run in tracking, failure detection, and understanding and incorporating verbal and spatial configurations, which were displayed as words and altitude figures. Further performance of the trials to test the applicability to task interferences effects and workload variance is indicated. M.S.K.

**A82-22924 *** **Instrument scan - Is it an indicator of the pilot's workload.** A. R. Ephrath, J. R. Tole, A. T. Stephens, and L. R. Young (MIT, Cambridge, MA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 257, 258. Grant No. NCC1-23.

Results of an investigation of the relationship between an aircraft pilot's visual scanning of instruments and the level of mental activity during a simulated approach and landing are presented. Noting that periods of activity which demand either close to 100% of human capacity or low levels of capacity are the times when most errors are committed, trials were conducted with three NASA test pilots in a terminal configured vehicle simulator. The pilots flew a normal approach while verbally responding to three digit stimuli to be judged plus or minus according to an order of magnitude scheme, and also while using a control stick to extinguish a light that came on and off to the right and left of the instrument panel. Eyescans of the instrumentation were monitored, and determinations were made of the most common instruments used during approach and flare. Fixation on instruments was found to increase with the arithmetic tasks. M.S.K.

**A82-22925** **On the training of the sharing skills - An attention viewpoint.** D. Gopher (Technion - Israel Institute of Technology, Haifa, Israel). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 259-263. 15 refs. USAF-supported research.

Training of time-sharing skills is discussed within an attention framework in which poor time-sharing performance is interpreted to stem from scarcity or inefficient utilization of processing resources. Practice is argued to increase resource availability either by reducing the resource demands of each task, improving coordination, or enhancing the voluntary control on resource allocation. Based on this analysis notions of skill generalizations and implications for the development of training procedures are examined. (Author)

**A82-22926** **Flight simulator runway visual textural cues for landing.** G. H. Buckland (USAF, Human Resources Laboratory, Williams AFB, AZ). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 286, 287.

The effect of visual textural patterns superimposed upon the runway touch-down zone area was studied as a potential factor in excessive vertical velocity at touchdown during flight simulation. Six simulated daytime runways with varying degrees of textural cues, as well as one night runway scene were used. The average vertical velocities at touchdown were higher in the simulator than comparable test landings in actual aircraft, but the textural cues did produce statistically significant differences in simulated vertical velocities at touchdown. Apparently the texture patterns did help to improve pilot performance, but they were not sufficient by themselves to completely solve the problem of excessive vertical velocities at touchdown. (Author)

**A82-22927** **The effect of inter-stimulus intervals on the perception of short flashes of red and green light.** R. P. Bateman (Texas A & M University, College Station, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 288-291. 11 refs.

The purpose of this investigation was to determine whether or not human perception of two equal flashes of colored light is a function of the interstimulus interval. Thirty subjects with normal color vision were presented with two 5 ms flashes of light, the first at 697 nm (red) and the second at 565 nm (green). The interstimulus interval was varied from 5 to 100 ms. When the interval was less than 30 ms, subjects reported seeing yellow flash. From 30 to 50 ms, subjects reported seeing only a green flash. Above 50 ms, subjects were able to identify two flashes, one red and one green. These results constitute a contradiction of Bloch's Law, which states that for interstimulus intervals less than 70 ms, stimuli are summed to produce perception. The implications of these results on a model for human color vision are discussed. (Author)

**A82-22928** * **The event-related brain potential as an index of attention allocation in complex displays.** C. D. Wickens, E. F. Heffley, A. F. Kramer, and E. Donchin (Illinois, University, Champaign, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 297-301. 10 refs. Contracts No. N00014-76-C-0002; No. F49620-79-C-0233; No. JPL-955610.

The advantages of employing the event-related brain potential (ERP) in the assessment of allocation of attention in dynamic environments are discussed. Three experiments are presented in which the P300 component of the ERP is demonstrated to be a useful index of subjects' locus of attention. The first two experiments were concerned with the allocation of attention during discrete and continuous visual monitoring tasks. The results indicated that a P300 was elicited only by stimuli to which the subject had to attend in order to perform successfully the task. The third experiment was conducted to assess the sensitivity of P300 to the manner in which attention is allocated to different aspects of a display during the performance of a 3-dimensional target acquisition task. The amplitude of the P300 was found to reflect differences between two levels of workload, as well as the task relevance of the stimuli. The results of the experiments are discussed in terms of their utility in the evaluation of the design of man-machine systems as well as in the study of the allocation of attention in operational environments. (Author)

**A82-22929** **The effects of age and ametropia on the dark focus of visual accommodation.** N. M. Simonelli (3M Co., Copying Products Div., St. Paul, MN). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 312-316. 11 refs. Contract No. F49620-77-C-0117.

The effects of age and ametropia on the dark focus of visual accommodation have gone largely unmeasured. Subject populations of young people are generally screened and their vision 'standardized' by testing them while they wear corrective lenses. In this study, 301 participants of both sexes, age 17 to 67, both nearsighted and farsighted were measured for their near points, far points, and dark focuses. It was found that the more nearsighted the eye the larger the dark focus shift. This increase in shifts, however, is relatively small over the commonly found range of ametropia. Age was also found to have a small effect on the dark focus. Older individuals tended to have a smaller dark focus shift, and the dark focus was found to recede with age at roughly the same rate as the far point. (Author)

**A82-22930** **Selection of Performance Evaluation Tests for Environmental Research.** R. C. Carter, R. S. Kennedy, and A. C. Bittner, Jr. (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 320-324. 17 refs. Navy Project MF58-524-002.

A study of various measures of human performance has been carried out in order to select Performance Evaluation Tests for Environmental Research (PETER) suitable for use in repeated measurements. Sources of tests which have been considered for PETER are examined together with plans for the selection of additional tests. Tests in the source batteries, including those that have and those that have not yet been considered for inclusion in PETER, are listed, and their performance contents are discussed. V.L.

**A82-22931** **The validity of task analytic information to human performance research in unusual environments.** R. H. Shannon (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 325-329. 10 refs.

Recurring naval student flight errors were collected using three types of task analytic methodologies: maneuver description questionnaires, critical incident technique of observed student problems and inflight maneuver rating forms. The results from these three efforts were highly correlated, which indicated that the task analytic methodology was valid; and therefore, would have utility in the future development of a performance battery for environmental research. (Author)

**A82-22932** **Performance Evaluation Tests for Environmental Research /PETER/ - Auditory digit span task.** D. B. McCafferty (West Florida, University, Pensacola, FL), A. C. Bittner, Jr., and R. C. Carter (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 330-334. 14 refs. Navy Project MF58-524-002.

The objective of the study was to determine whether baseline performance on the auditory digit span task would stabilize following repeated administration of both forward and backward digit span. The backward digit span scores became more and more correlated with the forward digit span scores as the experiment progressed, which indicated that the mental content of the two tests of memory converged with practice. The forward portion of the auditory digit span task was found to be suitable for use in environmental research employing repeated measures and was recommended for inclusion in a test battery as a measure of inattention or freedom from distraction and as an indicator of short-term memory or neurophysiological impairment. V.L.

**A82-22933** **Performance evaluation tests for environmental research /PETER/ - Landolt C reading test.** J. C. Guignard, A. V. Bittner, Jr., S. W. Einbender, and R. S. Kennedy (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 335-339. 22 refs. Navy Project MF58-524-002.

A Landolt C visual acuity test was evaluated for inclusion in a battery of Performance Evaluation Test for Environmental Research (PETER) for use in repeated measures experiments. Eight subjects were tested for 12 days to determine stability of means, standard deviations and cross-day correlations. Mixed results for these cross-day correlation analyses made questionable the stability of speed and error measures. Fine-structure analyses indicated that the task was more a measure of response accuracy than acuity. Fine-structure analyses in future performance test evaluation and exploration of 2 alternative visual acuity tests are recommended. It is concluded that the Landolt C test in the form used is not stable and cannot be recommended as a test of visual acuity for inclusion in PETER. (Author)

**A82-22934** **Item recognition as a Performance Evaluation Test for Environmental Research.** R. C. Carter, R. S. Kennedy, A. C. Bittner, Jr., and M. Krause (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 340-343. 16 refs.

Item Recognition (Sternberg, 1966) is a task which reflects the operation of human memory. This task was considered as a candidate for use in a battery of Performance Evaluation Tests for Environmental Research (PETER). Environmental research involves comparison of performances in a baseline environment and in a novel environment. It is desirable that scores be stable at different occasions in the baseline environment, so that changes due to the novel environment will be clear if they occur. It was found that item recognition results were similar to those obtained by other investigations, although the traditional item recognition score (slope) was unreliable across repeated measurements. The response time (RT) was stable for each of the four memory set sizes (1, 2, 3 and 4 items), from the standpoint of reliability, after the fourth session. (Author)

**A82-22935** **A catalogue of Performance Evaluation Tests for Environmental Research.** R. S. Kennedy, R. C. Carter, and A. C. Bittner, Jr. (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 344-348. 30 refs.

The stability and other characteristics of 15 performance tasks investigated as part of the Performance Evaluation Tests for Environmental Research program are examined. Progress is also reported on 45 additional tests which are being studied. All tasks exhibit stable means and variances after adequate practice. However, less than 30% meet minimal stability criteria for intertrial correlations, and substantial practice (typically more than an hour over five days) is required to achieve stability. V.L.

**A82-22936** **Comparison of memory tests for environmental research.** M. M. Harbeson, M. Krause, and R. S. Kennedy (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 349-353. 6 refs.

Four memory tests were considered for inclusion in a human performance test battery. The tests were administered to 23 Navy enlisted men for 15 consecutive days. Group means, standard deviations, and cross-session correlations were examined. Two of the tests, Interference Susceptibility and Free Recall, met the initial statistical criteria for inclusion in the test battery. However, the other tests, Running Recognition and List Differentiation failed to show sufficient task definition and reliability in their present form. These tests are compared with each other and with previous memory research studies. (Author)

**A82-22937** **Task analytic approach to human performance battery development.** R. H. Shannon (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 364-368. 10 refs.

Task analytic methods were used to isolate critical components of naval student flight performance. This goal was accomplished by utilizing factor and regression analyses to compare student maneuver errors during primary training to the overall phase grades of primary, basic and advanced. The results indicated that flight ability skills appear to be best measured by basic transitions, coordination flying and entries to dirty configurations. These items could be measured within a flight simulator. In a laboratory, these skills could best be measured by a performance battery which contained memory, problem-solving, continuous tracking tasks, and a time-sharing capability between continuous tracking and discrete tasks. In conclusion, the task analytic procedure was determined to be a feasible and useful undertaking in the development of performance measurement systems such as the PETER project. (Author)

**A82-22938** **Convergence-divergence with extended practice - Three applications.** M. B. Jones (Pennsylvania State University, Hershey, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 359-362. 18 refs.

It has been recognized that practicing a task might alter its correlation with an external measure. When the correlation increases, the task is said to converge on the external measure; if it decreases, the task diverges from the external measure. The implications of convergence-divergence with extended practice are discussed with reference to differential retention over long periods of no practice, personnel selection and classification, and the identification of latent scores. V.L.

**A82-22939** **Mental performance impairment in heat stress.** P. A. Hancock (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 363-366. 20 refs.

Data in the literature on the relationship between threshold for unimpaired mental performance and heat stress, and in particular the conclusions of Wing (1965), are re-evaluated in the light of more recent research. It is suggested that heat induced mental performance decrement is a function of imminent thermophysiological collapse and occurs at a much higher level of heat stress than Wing has proposed. It is pointed out, however, that although mental performance decrement before impending physiological collapse is slight, most control situations require constituents of motor performance more susceptible to heat. V.L.

**A82-22940** **Perception and performance in the heat.** M. Y. Beshir and J. D. Ramsey (Texas Tech University, Lubbock, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 367-371. 8 refs.

This study reports an evaluation of the effects of heat exposure on human subject's abilities to estimate their physiological responses, perceptual-motor performance and thermal comfort. The differences between male and female subjective estimates of the effects of heat on drowsiness, boredom, and fatigue are also reported. (Author)

**A82-22941** **Application of a predictive core temperature model to heat stress experimentation.** R. E. Schlegel (Oklahoma, University, Norman, OK). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 377-381. 8 refs.

An interactive procedure for evaluating and maintaining an individual's core temperature at a predetermined level was developed and tested. The procedure involved the use of previously developed models for predicting core temperature changes during work and rest. Various levels of metabolic activity were used for rapid core temperature elevation and adjustments in dry-bulb temperature and relative humidity maintained the desired core temperature level. Evaluation of the procedure was made using five female subjects at four different levels of elevation. Results are presented which show the accuracy of the control. (Author)

**A82-22942** **Core temperature, heart rate and sweatsuits.** M. W. Riley, D. J. Cochran, and J. W. Armstrong (Nebraska, University, Lincoln, NE). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.

Santa Monica, CA, Human Factors Society, Inc., 1980, p. 382-385. 6 refs.

Core temperature and heart rate are recorded for three male subjects, while jogging on a treadmill, to determine the influence of sweatsuits. Three trials were run and at each trial the subjects wore gym shorts and T-shirt, cotton sweat clothes, or vinyl sweat clothes. Results indicated the greatest physiological cost was required while exercising in vinyl sweat clothes and there was a significant difference in physiological cost due to the apparel worn. (Author)

**A82-22943** **An application of manned simulation in crew station conceptual development.** J. A. Fitzgerald, J. A. Wise, R. E. Rutkowski, and P. D. Biolchini (McDonnell Douglas Corp., St. Louis, MO). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 386-389.

The McDonnell Aircraft Company's Manned Air Combat Simulator is being used in the early design and evaluation phases of an advanced real-time reconnaissance aircraft. The cockpit arrangement and control logic have been implemented in the engineering development simulator. To date there have been two formal human factors evaluations of the system under simulated operational conditions. This presentation outlines the procedures used, the results, and their impact upon the design. (Author)

**A82-22944** **Application of preference tree methodology to choice behavior in a AAA supervisory control task.** C. Hale (Systems Research Laboratories, Inc., Dayton, OH) and S. Ward (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 400-404. 7 refs.

A study has been carried out to investigate the applicability of the elimination-by-aspects (EBA) model proposed by Tverski (1972) to situations involving active search for sequentially available information of varying value. Subjects were told to select the most appropriate one of three possible operating modes in a task designed to simulate supervisory decision making in an anti-aircraft artillery system. The results obtained in the experiment indicate that subjects search the information set in a compensatory manner, which contradicts the EBA model. Consideration of the various aspects of the experiment suggests that the EBA model is valid only in situations where the subject is faced with many alternatives following receipt of a complete information set. V.L.

**A82-22945** **Map interpretation and geographic orientation during nap-of-the-earth flight.** S. P. Rogers (Anacapa Sciences, Inc., Santa Barbara, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 414, 415.

A series of studies have been conducted to evaluate aviator's precision of geographic orientation during photographically simulated nap-of-the-earth (NOE) flight in unfamiliar areas. The findings of these studies suggest that if a topographic display is to be acceptable and useful to the average aviator, it must include more information than terrain relief alone. However, since many potential battlefields do not include cultural, hydrographic, or vegetation features useful in geographic orientation, additional training in terrain-relief analysis and contour line interpretation would greatly benefit NOE aviators. V.L.

**A82-22946** **Task taxonomies and modeling for system performance prediction.** G. L. Berry (Ohio State University, Columbus, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 425-429. 9 refs.

An approach is suggested for developing a systematic method of analyzing human machine systems and for formulating a task-oriented model from the analysis results. The role of task taxonomies in systematic analysis is examined. Digital simulation of task-oriented networks is shown to be a useful technique for predicting performance characteristics of human machine systems. The process of task analysis is used to abstract a task-oriented description from an actual system. Task analyses are based, either implicitly or explicitly, on a 'view of the world' or task taxonomy. To the extent that the task taxonomy is explicitly defined and used, the task analysis is objective, repeatable, and complete. It is concluded that further research needs to be done to examine available taxonomies and determine which produce the best results or under which conditions certain taxonomies might be used. B.J.

**A82-22947** **The finite intersection test - A new multivariate statistical technique applicable to the evaluation of complex systems.** J. M. Reising (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) and P. R. Krishnaiah (Pittsburgh, University, Pittsburgh, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 453-457. 5 refs. Grant No. AF-AFOSR-77-3239.

In complex human-machine systems, multidimensional behavior is required of the operator. Consequently, there is no commonly-accepted, single measure of operator performance which can be utilized to determine the efficiency of the human-machine interaction. Because the behavior is multidimensional, multivariate statistics must be used to analyze the multiple measures gathered during system evaluation. While multivariate analogues to analysis of variance (ANOVA) exist, there are also a number of candidate multivariate analogues to the post-ANOVA simultaneous comparison tests. This paper describes a newly developed multivariate, simultaneous comparison test - Finite Intersection Test (FIT) - and provides an example of FIT's application to the analysis of multivariate data. (Author)

**A82-22948** **An integrated approach to pilot performance evaluation.** R. L. Hockenberger and J. M. Childs (Seville Research Corp., Pensacola, FL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October, 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 462-465.

The issue of norm- versus criterion-referenced evaluation methods is discussed in the context of undergraduate pilot training, and an approach that integrates both methods is described. It is suggested that such an integrated approach would facilitate advanced training management concepts such as proficiency advancement, but would not pose significant user acceptance difficulties. (Author)

**A82-22949** **Legibility of smoke-obscured emergency exit signs.** P. G. Rasmussen, B. P. Chesterfield, and D. L. Lowrey (FAA, Civil Aeromedical Institute, Oklahoma City, OK). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 476-479. 10 refs.

Internally self-illuminated emergency exit signs were investigated to determine the effects of size and background luminance levels on overcoming the visual degradation resulting from the presence of smoke in the visual environment. The results indicate that increased size and background luminance levels can be effective, though inefficient, methods for improving legibility in the presence of dense smoke. (Author)

**A82-22950** **Finding a needle in a haystack when you've never seen a needle - A human factors analysis of SETI.** T. Blake (California State University, Northridge, CA) and J. C. Baird (Dartmouth College, Hanover, NH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 492-496.

An analysis of some key human factors aspects of NASA's SETI (Search for Extraterrestrial Intelligence) program is presented. The results of some preliminary studies in human discrimination and recognition of patterns embedded in gaussian noise fields where the nature of the signal is unknown are discussed. A strategy for employing human pattern recognition capabilities in the SETI context, or in similar applications where signal attributes cannot be determined apriori, is offered. (Author)

**A82-22951** **Bivariate response distributions in visual detection and discrimination.** L. A. Olzak (California, University, Los Angeles, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 502-506. 5 refs.

Two patterns can sometimes be discriminated from one another better than they are detected. A Signal Detection analysis of the information used to perform these psychophysical judgments suggests that properties exist in the visual system which favor the ability to discriminate over the ability to detect. Two candidate properties are inhibition and/or correlated noise between tuned spatial frequency analyzers. The extent to which such processes occur is reflected by the parameters defining sensory response distributions in a Signal Detection model of pattern perception. A method by which these parameters can be estimated is described, and several alternative response spaces are discussed. (Author)

**A82-22962** **Model of visual detection and discrimination.** J. P. Thomas (California, University, Los Angeles, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 507-510. 6 refs. Grant No. NIH-EY-380.

A model of visual detection and discrimination is presented which incorporates recent concepts of multiple, spatially-tuned channels. Predictions about performance on detection and discrimination tasks are derived and supporting data presented. The predictions and data are inconsistent with threshold-type models. (Author)

**A82-22963** **Required performance levels for autocueing devices.** D. C. Fulkerson (Hughes Aircraft Co., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 511-515. Research supported by the Hughes Aircraft Co.

Acquisition of tactical targets embedded in synthetic aperture radar (SAR) imagery was examined in this study. Experienced radar operators saw static scenes with either nine, five, two, or zero possible targets annotated, representing the application of three hypothetical autocueing devices and a no-autocueing baseline condition. In the autocueing conditions, the true target was always annotated, along with a variable number of false alarms, based upon the sophistication of the hypothesized autocuer. With time and probability performance measures taken, a significant improvement in target acquisition behavior was achieved only with the most sophisticated autocuer. This was most evident for the more difficult target types. (Author)

**A82-22964** **Is image quality important.** C. P. Greening (Northrop Corp., Hawthorne, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 516-520. 12 refs. Contract No. N60530-78-C-0188.

The problem addressed by the study was to explore the feasibility of predicting air-to-ground target acquisition performance with electro-optical systems, based on 'real world' data, in terms of specifiable, measureable, sensor image quality characteristics. The approach was to review flight test and simulator test results, rejecting those which did not permit comparison of different image qualities under similar conditions. The surviving data sets did not, in general, use comparable measures of either image quality or performance. Consequently, a review of the relevant measures of those variables was also made. To the limited extent permitted by the data, it can be stated that (1) poor image quality sets performance limits, and (2) further improvement of adequate imagery results in rapidly diminishing benefits. (Author)

**A82-22955** **Enhancement processes in the visual detection of barely perceptible targets.** M. Williams, N. Weisstein, and J. Brown (New York, State University, Buffalo, NY). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 521-525. Abridged.

Experiments are described in which six context patterns yielded significantly different ratings of perceived depth and three context patterns yielded significantly different ratings of perceived connectedness. Observers judged which of two target lines was presented; the line was briefly flashed by itself or was accompanied by one of the nine context patterns. The context pattern appeared simultaneously or followed the target after 30 to 270 msec. Results show that both the variations in perceived depth and the variations in perceived connectedness produced differences in metacontrast functions. Visual response to different spatial frequencies was also tested by blurring the stimuli, thereby diminishing visual response to high spatial frequencies. Results show that blurring the stimuli had striking effects on the temporal functions of accuracy versus delay of the context patterns varying in perceived depth (metacontrast functions): the functions for the patterns rated higher in depth became more like those for the flatter patterns. C.R.

**A82-22956** **Flight parameters and observer performance in RPV target acquisition.** H. Mutschler (Fraunhofer-Institut für Informations- und Datenverarbeitung IITP, Karlsruhe, West Germany). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 526-530. 5 refs. Research supported by the Bundesministerium der Verteidigung.

Observer's performance in a situation simulating real-time air-to-ground reconnaissance by means of a remotely piloted vehicle (RPV) has been investigated as a function of flight altitude, speed, line of sight of the sensor, and frame rate. Variations of flight and optic parameters within the limiting conditions of high speed and low-level flight result in only slight variations of observer target acquisition performance. However, from the military point of view, the resulting detection rates of 10-50% are too low. This can be corrected by reducing target uncertainty (multiple reconnaissance missions) or by combining observers in a team. V.L.

**A82-22957** **Effects of video bandwidth compression processing on operator performance in the Mini-RPV system.** A. K. Agin (Hughes Aircraft Co., Display Systems Dept., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 531-535. Grant No. DAAB07-78-C-2415.

The purpose of this study was to evaluate operator target detection and recognition performance under realistic conditions to provide design information for the Army Mini-RPV (Remotely Piloted Vehicle) system. Bandwidth compression, atmospheric attenuation, target numerosity, target aspect angle, target type, and background complexity were investigated. The tasks included detection and recognition of realistic tactical vehicle targets with a 256 by 282 element video system. There were five bandwidth compression levels with respect to a 3.02 megabit per second uncompressed rate. Detection performance was significantly degraded at a 15:1 compression ratio, and recognition was degraded at a 7.5:1 comoression ratio. Both target numerosity and aspect angle were associated with significant differences in performance. Atmospheric attenuation, target type and background complexity effects were not statistically significant. (Author)

**A82-22958** **Canopy induced displacement evaluation.** M. L. Frazier (USAF, Flight Test Center, Edwards AFB, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 552-556.

The optical properties of an aircraft canopy are examined with reference to the target displacement caused by the curved canopy, eye position effect on target displacement, and elevation displacement effects on air-to-air and air-to-ground weapons delivery. It is found that the average absolute target displacement increases with the viewing height and that there is a considerable parallax between the right and left eyes at 1 in. below design eye position. It is concluded that the integrated effects of pilot eye position, head-up display symbology, and canopy optics must be evaluated early in the system acquisition process. V.L.

**A82-22959** **Operational performance measures for air combat - Development and application.** A. P. Ciavarelli, A. M. Williams, and F. Krasovec (Dunlap and Associates, Inc., La Jolla, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.

Santa Monica, CA, Human Factors Society, Inc., 1980, p. 560-564. 10 refs. Contracts No. N61339-77-C-0167; No. N61339-78-C-0136.

The development, operation, and effectiveness of the Navy Tactical Aircrew Combat Training System (TACTS) are reviewed. TACTS was developed to use operational aircraft mock-ups to simulate realistic dogfights which could be recorded, monitored, and graded. Reference scores were developed to score missile hits as a measure of task accuracy, to measure and set group performance standards, and to set standards for detection of targets and overall engagement outcomes. Best and worst case scenarios have been detailed for kill or be killed results in terms of percentages of success due to radar sighting or not, or first shot or not. Pilots undergoing TACTS training are also provided with data from the Performance Assessment and Appraisal System, which allows comparison between their actions and responses with statistically determined optimum performance parameters. M.S.K.

**A82-22960** **Operational performance measures for carrier landing - Development and application.** C. A. Brictson, S. T. Breidenbach (Dunlap and Associates, Inc., La Jolla, CA), and G. R. Stoffer (U.S. Navy, Naval Training Equipment Center, Orlando, FL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 565-567. 17 refs. Contract No. N61339-75-C-0106.

Fifteen years of carrier landing performance criteria development and applications are described. An offshoot of the research resulted in the emergence of an automated performance measurement and appraisal system designed to enhance the effectiveness of night carrier landing. (Author)

**A82-22961** **Development and inflight testing of a multimedia course for instructing navigation for night nap-of-the-earth flight.** B. A. Smith (Canyon Research Group, Inc., Fort Rucker, AL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 568-571. 7 refs.

This paper describes the development and evaluation of a course of instruction to train Army aviators to navigate during flight operations at nap-of-the-earth (NOE) altitudes at night. The course was developed to provide instruction in map interpretation and terrain analysis using both unaided (naked eye) and aided (Night Vision Goggles) vision, and incorporated lecture, textual, and visual materials. Evaluation of the course was carried out in the UH-1 helicopter flying at NOE altitudes at night. Results of the evaluation indicated that a group of student pilots who received instruction in the course navigated at night along an NOE route with significantly more accuracy than did a control group. Implications of these results for training NOE night navigation are discussed. (Author)

**A82-22962** **Cognitive styles and the acquisition of a complex aerial maneuver.** J. M. Koonce and T. M. McCloy (U.S. Air Force Academy, Colorado Springs, CO). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 578-580. 6 refs.

Approximately equal number of male (45) and female (43) Air Force Academy cadets learned a complex aerial maneuver (chandelle) on a desk-top flight simulator. Prior to the introduction of the complex maneuver all subjects were trained to criterion level on four basic instrument flight maneuvers. Then they learned how to fly the complex maneuver with the number of trials required to reach criterion performance as the dependent variable. Results indicated cognitive factors were very significant in predicting complex maneuver performance. Additionally, individually tailoring the regression equations by sex as opposed to utilizing a general overall regression equation greatly enhanced predictive capability. (Author)

**A82-22963** **The effects of social facilitation on vigilance performance.** K. Unger, C. G. Halcomb, R. P. McGlynn (Texas Tech University, Lubbock, TX), M. G. Copeland (TRW, Inc., Redondo Beach, CA), and J. T. Roth (Applied Science Associates, Valencia, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 595-599. 14 refs.

Two experiments were conducted to determine if vigilance performance could be reliably improved by the presence of potentially evaluative or nonevaluative coactors, and to examine differential predictions regarding the necessary conditions for social facilitation. Neither the mere presence of a coactor nor the presence of evaluation potential was found to improve performance. (Author)

**A82-22964** **Theories of vigilance - A modern perspective.** M. Loeb (Louisville, University, Louisville, KY) and E. A. Alluisi. In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 600-604. 45 refs.

Principal theories of vigilance are categorized in terms of learning, neurological, psychophysical, and information processing models. Inhibition and reinforcement theories are reviewed in the light of available experimental evidence, and the difficulties inherent in observing all observing responses are noted. Arousal and habituation neurological models are examined, with mention made of the multidimensional nature of cortical rhythms associated with arousal. Psychophysical models comprise expectancy and probability matching scenarios, with experimental results indicating that expectancy of stimulus causes a decrement in performance due to fewer stimuli than expected or predicted. Finally, information processing models are considered in terms of a filter theory and channel capacity, with the observation that high rates of information loading eventually cause performance decrements which are different from those of habituation criteria. M.S.K.

**A82-22965** **New approaches to the electrophysiological characterization of vigilance behavior.** J. C. Miller (Human Factors Research, Inc., Goleta, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 606-610. 11 refs.

Justifications for two expanded approaches to the assessment of the physiological correlates of vigilance behavior are presented. The approaches include the consideration of heart rate within the context of cardiovascular function and the short-epoch analysis of the spontaneous EEG. (Author)

**A82-22966** **Recognition of VDU presented colors by color defective observers.** H. Bergman and F. Duijnhouwer (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 611-615. 10 refs.

In order to determine the extent to which color defective observers are able to recognize colors presented on a VDU, a choice reaction time experiment was carried out. The experiment determined the effect of advance training, stimulus size and simultaneous color contrast on the performance of subjects, segregated into groups according to the nature of their color vision defect. Analysis of the data shows that type of color vision defect and the simultaneous color contrast influence the number of errors made by the subjects. Suggestions for future experiments and for the possible improvement of performance are given. (Author)

**A82-22967** **Eyes and glass curtains - Visual accommodation, the Mandelbaum effect, and apparent size.** R. A. Benel (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 616-620. 8 refs. Contract No. F49620-77-C-0117.

During vehicle operation visual acquisition of information frequently occurs through an interposed surface, e.g., a windscreen. Then the eye may focus either the windscreen or the distant object. Circumstances have been documented where the interposed surface provides a more or less obligatory stimulus to accommodation. The apparent size of an object has been shown to relate to accommodation distance. These experiments investigated the relationship between the trapping of accommodation at a near distance (Mandelbaum effect) and changes in the apparent size of an object. In experiment I, 24 observers reported smaller size with nearer accommodation and larger apparent size with farther accommodation at a better than chance rate. The 12 observers in experiment II showed a consistent diminution of mean apparent size of an object as a screen was moved nearer to them. These two situations provide interposed texture analagous to windscreens. The implications for vehicle control are discussed. (Author)

**A82-22968** **Scaling of perceived optical distortion.** F. E. Ward and D. F. Quinn (Wright State University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 622-625.

Two studies have been carried out to explore scaling of patterns that stimulate optically induced visual distortions. In the first study, subjects rank-ordered computer-generated sine wave patterns in order of distortion severity. The rankings corresponded to the physical parameters of frequency and amplitude. In the second study, all possible pairs of 48 stimuli were rated on a dissimilarity index. The data were analyzed by a nonmetric multidimensional scaling procedure. It is found that a third dimension, that is best described as 'waviness' or 'flat versus depth', is necessary, in addition to frequency and amplitude, to adequately describe the data. V.L.

**A82-22969** **Effect of the Circutone seat on hemodynamic, subjective and thermal responses during prolonged sitting.** E. Shvartz, J. G. Gaume, R. T. White, R. C. Reibold (Douglas Aircraft Co., Long Beach, CA), and E. J. Glassford (Mercy Hospital and Medical Center, San Diego, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 639-642. 5 refs.

Seven young men were administered a series of tests during 5 hours of quiet sitting performed two times on two different days. On one day, a massage-type seat cushion was used for 14 min/hour. Hemodynamic responses (measured by an impedance plethysmograph), skin temperature, body weight, urine changes and subjective reactions were noted. Changing from supine to sitting brought on decreases in stroke volume and leg blood flow and blood pooling in the calf and thigh. When the seat cushion was not activated, 5 hours of sitting resulted in a continuous decrease in calf blood flow and in an increase in calf venous pooling; increase in blood pressure and stable cardiac output; very low urine output and a large increase in skin temperature discomfort. The seat cushion caused a substantial exchange of the stagnant blood in the calf and thigh; a tendency to increase calf and thigh blood flow and decrease calf and thigh venous pooling; and less subjective discomfort sensations. The results indicate that the principal adverse hemodynamic effect of prolonged sitting is blood pooling in the lower legs, which, however, is compensated by an increase in blood pressure. C.R.

**A82-22970** **The effects of left hand fatigue on right hand performance.** M. E. Benton and R. P. Bateman (Texas A & M University, College Station, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 643-646.

Twenty-five subjects performed tracking tasks with the right arm before and after cranking a bicycle ergometer with the left arm. Three experimental conditions consisted of cranking the ergometer for 60, 90, and 120 seconds. The results indicate there was a significant decrement in tracking performance the first ten seconds after each of the cranking periods. By thirty seconds after cranking, tracking performance returned to pre-cranking level for each of the conditions. The decrement was not attributable to heart rate or breathing rate increases which remained for periods of up to five minutes. The crossover fatigue effect warrants further study. (Author)

**A82-22971** **Some current issues in workload assessment.** F. T. Eggemeier (Systems Research Laboratories, Inc.; Wright State University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 669-673. 15 refs.

Two current issues related to operator workload assessment include the effects of operator strategy on levels of load experienced by the operator and the nature of operator information processing capacities and resources. Several current positions related to each of these issues are presented, and implications for workload assessment are discussed. It is concluded that workload is a multidimensional construct which requires the development of an assessment battery which should include subjective, performance-based, and physiological measures. (Author)

**A82-22972** **Enhancing operator acceptance and noninterference in secondary task measures of workload.** C. A. Shingledecker (Systems Research Laboratories, Inc., Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 674-677. 7 refs.

A serious disadvantage of many available secondary task measures of operator workload is that they are difficult to employ during later stages of system design and evaluation. Common problems with traditional laboratory tasks include poor operator acceptance and the potential for intrusion on primary tasks. Two methods designed to overcome these limitations are being investigated at the Air Force Aerospace Medical Research Laboratory. In order to improve integration of the measurement task with the operator's duties, realistic aircraft radio communications activities have been developed as secondary tasks. Analytical and subjective methods have been employed to develop communications tasks with scaled workload values. A second project has focused on further development of the interval production task as a workload metric. This task has minimal response requirements and appears to act as an index of load rather than a reserve capacity test. (Author)

**A82-22973** **Steady state average evoked potentials as a measure of tracking difficulty.** G. F. Wilson (Systems Research Laboratories, Inc.; Wittenberg University, Springfield, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 678-680.

The utility of steady state average evoked potentials (AEPs) to measure the difficulty of a tracking task will be reported. Medium (14 Hz) and high (50-56 Hz) frequency sine wave modulated light was used to evoke steady state AEPs while subjects performed a tracking task. Three levels of difficulty, based upon each subject's ability, were used in the single axis visual tracking task. The phase lag between stimulus input and the AEP waveform was found to be significantly related to task difficulty. Increasing difficulty levels were associated with greater amounts of phase lag of the AEPs during the high frequency stimulation. Neither the phase lag nor the amplitude of the medium frequency AEPs were significantly affected by the level of tracking difficulty. Each subject was found to have one particular frequency of stimulation in the high range which produced an enhanced AEP amplitude. This suggests that researchers using high frequency stimulation with sine wave modulated light should test each subject to find the frequency which produces the maximal amplitude. (Author)

**A82-22976 *** **Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979.** Edited by J. Billingham (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field, CA). Cambridge, MA, MIT Press, 1981. 478 p. $20.

Papers are presented concerning the nature and distribution of life in the universe, particularly in the areas of the origins of life, life-supporting environments, the evolution of life in the Galaxy, and the detectability of technological civilizations. Specific topics include a preliminary discussion of the role of life in the universe, followed by examination of the role of water in thin films and cold environments in the origin of life, the relation between atmospheric composition and evolution, the possibility of planetary orbits in multiple star systems, and the prospects for detecting extrasolar planetary systems. Attention is also given to the origin of protein synthesis, the evolution of intelligence in multicellular organisms, the manifestations of advanced civilizations, and plans and principles for SETI. A.L.W.

**A82-22978 * #** **Organic chemical evolution.** S. Chang (NASA, Ames Research Center, Moffett Field, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 21-46. 14 refs.

The course of organic chemical evolution preceding the emergence of life on earth is discussed based on evidence of processes occurring in interstellar space, the solar system and the primitive earth. Following a brief review of the equilibrium condensation model for the origin and evolution of the solar system, consideration is given to the nature and organic chemistry of interstellar clouds, comets, Jupiter, meteorites, Venus and Mars, and the prebiotic earth. Major issues to be resolved in the study of organic chemical evolution on earth are identified regarding condensation and accretion in the solar nebula, early geological evolution, the origin and evolution of the atmosphere, organic production rates, organic-inorganic interactions, environmental fluctuations, phase separation and molecular selectivity. A.L.W.

A82-22979 # **Sulfur - Fountainhead of life in the universe.** B. C. Clark. In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 47-60. 26 refs.

The important role of sulfur and sulfur compounds in biology, planetary evolution and the universe as a whole is discussed, and the possibility of the existence of sulfur-based life in otherwise inhospitable environments is considered. The high abundance of sulfur, which is produced during explosive oxygen burning in supernovas, in the universe is noted, and its roles in the evolution of the earth and other planets, and in biological energetics and enzyme catalysis are examined. The significance of the discovery of small, isolated, ecosystems at the mouths of active hydrothermal vents in the Galapagos rift zone for the existence of chemoautotrophs using sulfur as an energy source is considered, and it is concluded that chemoautotrophy based on sulfur may allow the widening of the zone about each star believed capable of supporting life. A.L.W.

A82-22980 # **Role of interfacial water and water in thin films in the origin of life.** D. M. Anderson (New York, State University, Buffalo, NY). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 61-74. 16 refs.

The properties of clay-water interfaces at low temperatures are examined in view of the probable importance of such regions in abiotic syntheses of the chemical precursors of cellular life. Particular attention is given to the structure and formation of the liquid-like layers at ice-ice, ice-air, silicate-water-air, silicate-water-silicate and silicate-water-ice interfaces at temperatures below 0 C, and the great physical and chemical diversity of these interfaces is pointed out. It is shown that water film environments could have supported a wide variety of organic reactions important in the origin of life due to the stabilizing presence of clay substrates, the catalytic properties of the clay surfaces, the various geometrical characteristics of the clay surfaces and the presence of liquid phase at relatively high water activities below the freezing point of water. A.L.W.

A82-22981 * # **Atmospheres and evolution.** L. Margulis (Boston University, Boston, MA) and J. E. Lovelock (Reading, University, Reading, Berks., England). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 79-100. 24 refs. Research supported by Boston University and Guggenheim Foundation; Grant No. NGR-22-004-025.

Studies concerning the regulation of the earth atmosphere and the relation of atmospheric changes to the evolution of microbial life are reviewed. The improbable nature of the composition of the earth atmosphere in light of the atmospheric compositions of Mars and Venus and equilibrium considerations is pointed out, and evidence for the existence of microbial (procaryotic) life on earth as far back as 3.5 billion years ago is presented. The emergence of eucaryotic life in the Phanerozoic due to evolving symbioses between different procaryotic species is discussed with examples given of present-day symbiotic relationships between bacteria and eucaryotes. The idea that atmospheric gases are kept in balance mainly by the actions of bacterial cells is then considered, and it is argued that species diversity is necessary for the maintenance and origin of life on earth in its present form. A.L.W.

A82-22982 # **Origin and evolution of continents and oceans.** K. K. Turekian (Yale University, New Haven, CT). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 101-110. 21 refs.

The growth histories and origins of the continental and oceanic crust and oceanic basins on earth are discussed. Isotopic constraints on the origin of crustal and midocean ridge materials are examined, and it is noted that heat generated by the radioactive decay of U, Th and K must have been the driving force for the transformation of undepleted mantle into depleted mantle by the formation of continental crust. The question of whether the oceans are increasing in volume is considered, and it is contended that water and other volatiles were released to the surface early in the history of the earth, so that there need be no correlation with continental crust formation and the volumetric growth of the oceans. Finally, the apparent age of the continents (3.8 billion years) is attributed to the destruction of continental crust upon reinjection into the mantle at a time when mantle resorption was more efficient than presently. A.L.W.

A82-22986 # **Constraints on early life by earth's accretional and preaccretional development.** G. Arrhenius (California, University, La Jolla, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 125, 126. Abridged.

Despite the importance of the thermal state of the earth and the properties of the primordial ocean-atmosphere system for the origin of life, the accretionary history and early evolution of the earth remain hypothetical. Recent exploration of the moon, Jupiter and the terrestrial planets including the earth has, however, clarified some earlier limitations on the primordial earth environment and uncovered new information with a direct bearing on the problem. The observational framework supports a variety of accretional hypotheses, leading to drastically different early states but all sharing such common concepts as evolution via planetesimals and with sterilizing and pyrolyzing runaway accretion at some stage. Future space exploration should further narrow the range of possible states for the early earth and other planets. A.L.W.

A82-22991 # **Transfer RNA and the origin of protein synthesis.** A. Rich (MIT, Cambridge, MA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 211-228. 19 refs.

The current state of knowledge regarding the developments which led to the establishment of life on this planet is briefly reviewed. One of the central research goals is the definition of the physical nature of the interactions which occur between messenger RNA (mRNA) and transfer RNA (tRNA). Investigations regarding the structure of tRNA are considered, taking into account studies conducted with yeast phenylalanine tRNA. Attention is given to hydrogen bonding and base stacking, tRNA in solution, initiator and chain-elongation transfer RNAs, and the mechanism whereby nature differentiates between different tRNA species during aminoacylation. It is concluded that there are currently no convincing models for the origin of polynucleotide-directed polypeptide formation. However, it is believed that the molecular mechanics of mRNA reading in the ribosome as well as peptide bond formation may provide a clue to its origin. G.R.

A82-22992 # **Emergence and radiation of multicellular organisms.** J. W. Valentine (California, University, Santa Barbara, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 229-257. 41 refs.

An attempt is made to assess the factors which led to the origin of major (phylum-level) multicellular grades and ground plans. The question is considered whether an evolution of multicellular grades starting a second time under the same conditions would lead to the same results. Attention is also given to the results of an evolution repeated under different environmental conditions as on another planet. The fossil record of metazoan body plans is discussed along with aspects of macroevolution and microevolution, scenarios of quantum events in evolution, and the general case of multicellular evolution. It is concluded that macroevolution is probably a universal feature of life. Macroevolutionary factors should affect multicellular diversification patterns on other worlds, much as they do on earth, although the results would vary with environmental conditions. Microevolution, however, might be an entirely different matter elsewhere. G.R.

**A82-22993** # **Speculations on the evolution of intelligence in multicellular organisms.** D. A. Russell (National Museum of Natural Sciences, Ottawa, Canada). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 259-275. 56 refs.

An understanding of the factors which can affect the evaluation of intelligence is important in evaluating the Cosmos as a home for intelligent organisms. The brain is the organ of intelligence. There is evidence of a correlation between brain size and intelligence. On earth, more than 700 million years elapsed between the appearance of multicellular metazoans and Homo sapiens. In order to discover to what extent encephalization rates may have changed during this interval, an investigation is conducted regarding the distribution of the highest levels of encephalization through time. The biology of encephalization is discussed, taking into account temperature, time, biogenic environmental diversity, area, mass extinctions, adaptation, trophic level, metabolism, dimensional complexity, and parental care. It is concluded that for the development of intelligent organisms, the general environmental framework of a planet should resemble that of earth during the past half-billion years. G.R.

**A82-22994** # **Evolution of technological species.** B. Campbell (L.S.B. Leakey Foundation, Pasadena, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 277-285.

The term 'technological species' is used to denote any species of animal which employs tools. It is pointed out that the use of tools is not confined to man. Examples include the Galápagos finch Cactospiza, which uses a cactus spike to poke out insects embedded in the branches or trunks of trees. A brief review of terrestrial technology is conducted. The development of facilities and fire was critical in the establishment of a metal technology. Adequate resources derived from agriculture were essential for the development of advanced technology. At all stages, the ratio of cost to reward had to be small and the technological development had to follow an appropriate cultural preadaptation. Attention is given to the factors which made this development possible, taking into account the evolution of social groups. In an extraterrestrial context, a description is given of the characteristics to be expected in the case of organisms with radiotelescopes. G.R.

**A82-22996** # **Biochemical keys to the emergence of complex life.** K. M. Towe (Smithsonian Institution, Washington, DC). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 297-306. 40 refs.

If there is intelligent life elsewhere in the universe, it will probably be of the complex multicellular type. The considered investigation is concerned with the fundamental importance of two protein amino acids to the development of complex multicellular life on earth, taking into account hydroxyproline and hydroxylysine. The absence of these acids from the genetic code implies that they are relatively new with respect to biological evolution. It is found that the two amino acids are widely distributed among the higher forms of life but are generally absent from lower organisms. The evolution of the capacity for complex multicellular development on earth required over 2 billion years. This length of time appears to be good evidence that no combination of the 20 coded amino acids could be found that could produce a structural protein comparable to the extensin-collagen family. The development of entirely new amino acids was the real key to opening the way for complex multicellularity. G.R.

**A82-22997** * # **Gravity, lignification, and land plant evolution.** S. M. Siegel, B. Z. Siegel, and J. Chen (Hawaii, University, Honolulu, HI). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 307-316. 22 refs. Grant No. NGR-12-001-053; Contracts No. NASw-767; No. NAS2-6624; No. NAS2-8687.

Vascular plants began their occupation of the wetlands interfacing both terrestrial and marine environments at some point in early Paleozoic time. Chemical differences between green algae and vascular land plants are mainly related to an abundance of lignins in the land plants. Answers to questions relating to the phylogeny and adaptive significance of the lignins must depend on experiments and observations using contemporary plant material. A summary is provided of a series of such observations. It is found that the differences between modern Chlorophyta and vascular land plants cannot be explained in full on the basis of lignification alone. Nevertheless, the data point to the emergence of the primitive land populations into an oxygen-rich terrestrial world where the need for mechanical support and water conservation could be met by a single aerobic biochemical process connected to essential aromatic amino acids likely to be found in every cell. G.R.

**A82-22998** # **Evolution of man and its implications for general principles of the evolution of intelligent life.** C. O. Lovejoy (Kent State University, Kent, OH). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 317-329. 28 refs.

An investigation regarding the probability of intelligent life on suitable planets must consider one basic question concerning the existence of fundamental evolutionary trends which led to the appearance of man. The question is studied by taking into account three specific aspects. One is concerned with questions regarding the natural evolution of biological systems toward more complex states. It is found that there is no such trend toward complexity. The second problem involves the relation between increased intelligence and aspects of survival and reproduction. It is shown that there is no a priori advantage to intelligence. The evolution of cognition is found to be the consequence of a series of highly specific evolutionary events whose ultimate cause is traceable to selection for unrelated characters such as locomotion and diet. The conclusion is reached that intelligence is not the product of a general trend. Man is, therefore, a highly specific, unique, and unduplicated species. G.R.

**A82-23089** **Training for space.** G. L. Borrowman. *Spaceflight*, vol. 24, Mar. 1982, p. 129-132.

Specific aspects of training for space activities are reviewed, with particular attention paid to the experiences of the Soyuz crews, the make-up of the Shuttle crews, and to the presence of female astronauts. The basic Shuttle crew will consist of the commander, a pilot, and a mission specialist, who is usually a scientist, in addition to a payload specialist who will perform activities in a particular field of expertise, while otherwise having training in living, working, and responding to emergency situations in space. The negative effects of competitive personalities have been observed in spaceflight and current psychological profiling in choosing candidates for spaceflight are designed to avoid such traits. The choices of centile ratings for sizing spacesuits, window placements, and control reach distances are outlined, along with equipment necessities peculiar to women. M.S.K.

**A82-23136** † **Modeling of the synthesis of peptide-like compounds in the primeval lithosphere of the earth (Modelirovanie sinteza peptidopodobnykh soedinenii v litosfere pervobytnoi zemli).** G. A. Lavrent'ev, L. Iu. Rakitin, T. F. Strigunkova, and I. A. Egorov (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 261, no. 5, 1981, p. 1263-1267. 11 refs. In Russian.

Experiments were performed to study the possibility of the synthesis of peptide-like structure from amino acids in the presence of mineral catalyzers in the case of moisture fluctuations at temperatures below the water-boiling point. The results suggest that the formation of polymer molecules of peptide structure on mineral catalyzer substrates was a widespread phenomenon on the primeval earth at early stages of the existence of the condensed-water phase. This makes it possible to conclude that a great deal of the primeval lithosphere was conducive to the abiogenic synthesis of organic molecules, involving polymerization with the aid of mineral catalyzers. B.J.

**A82-23144** † **Changes in the activity of monoaminergic systems of the brain under conditions of adaptation to high altitude (Izmeneniia aktivnosti monoaminergicheskikh sistem mozga v usloviiakh adaptatsii k vysokogor'iu).** E. A. Gromova, V. A. Isabaeva, T. P. Semenova, T. M. Isakunova, and O. N. Li (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii

Vysokogor'ia, Frunze, Kirgiz SSR; Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 262, no. 1, 1982, p. 245-247. 12 refs. In Russian.

**A82-23166 † Phase characteristics of the response of the hypophysal-adrenal system under high-altitude conditions (Faznost' reaktsii gipofiz adrenalovoi sistemy v usloviiakh vysokogor'ia).** D. T. Musabekov, O. K. Kabiev, and Iu. G. Grigor'ev (Kazakhskii Institut Onkologii i Radiologii, Alma-Ata, Kazakh SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 20-24. 10 refs. In Russian.

The phases and rhythms of the adaptive responses of the hypophysis-adrenal cortex system to extended exposure to conditions of chronic altitude hypoxia are investigated in order to gain insight into the temporal organization of hormonal mechanisms of adaptation to high-altitude conditions. Variations in total body weight, hypophysal and adrenal weight, and peripheral blood plasma 11-oxycortocosteroid concentration were determined in rats during a 120-day adaptation period to altitude at Tian'-Shan' (3340 m), and controls kept at Alma-Ata (847 m). Phasic variations in these parameters are found which are characterized by various periods different from those of any natural or latent low-frequency biorhythms. Results may have practical applications in the selection of optimal adaptation schedules under chronic altitude hypoxia and the prediction of individual responses to extremal conditions. A.L.W.

**A82-23167 † Morphological changes in the hematopoietic organs of rats under the influence of adrenalin (Morfologicheskie izmeneniia v krovetvornykh organakh krys pod vliianiem adrenalina).** A. S. Khil'ko (Slavianskii Pedagogicheskii Institut, Slavyansk, Ukrainian SSR) and B. A. Kamenev (Bazovyi Sanatorii Donbass, Slavyansk, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 40-45. 12 refs. In Russian.

Morphological changes in the bone marrow, spleen and lymph nodes resulting from injection of small doses of adrenalin are investigated as a model of the nonspecific stress response in rats. Changes in peripheral blood leucocyte contents were determined 2 h after the injection of adrenalin at a dose of 0.25 mg/kg, and compared with tissue morphologies. The injection of adrenalin is found to induce real changes in peripheral blood leukocyte composition consisting of varying degrees of either leucocytosis or leukopenia and a redistribution of the levels of each type of leucocyte. Changes in leucocyte composition are reflected by changes in the morphology of the blood-forming organs, which are characterized by an activation or suppression of blood formation in the leucocytotic and leukopenic reactions, respectively. Functional and morphological changes in response to adrenalin injection are thus capable of serving as a model of the disturbances brought about by stress states. A.L.W.

**A82-23168 † The condition of certain glycolytic and tricarboxylic acid cycle enzymes in intact and denervated skeletal muscles of the rat during cooling (Sostoianie nekotorykh fermentov glikoliza i trikarbonovogo tsikla v intaktnykh i denervirovannykh skeletnykh myshtsakh krys pri okhlazhdenii).** L. F. Shcherbak (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 46-51. 19 refs. In Russian.

**A82-23169 † Analysis of the effects of isoprenaline on the energy consumption of skeletal muscle (Analiz deistviia izoprenalina na energotraty skeletnoi myshtsy).** N. I. Putilin, A. G. Kozlov, Iu. Iu. Men'shikh, V. I. Zav'ialov, and G. S. Pekach (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 52-55. 14 refs. In Russian.

The kinetics of the action of the beta-adrenomimetic isoprenaline on energy consumption in a working skeletal muscle is analyzed in order to investigate its mechanism of action. Heat production, work capacity and energy efficiency were measured as a function of the dose of isoprenaline as it varied between 5 x 10 to the -6th and 5 x 10 to the -9th g/ml in isolated preparations of the frog sartorius muscle. Nonlinear dose-response curves were obtained with extremum values at doses of 5 x 10 to the -8th and 5 x 10 to the -9th g/ml, which are attributed to desensitization by high doses of the drug. The results are used to derive values for the apparent Michaelis-Menten constant and the constant of substrate inhibition. It is noted that the condition of the muscle with respect to fatigue also determines the kinetics of adrenergic regulation. A.L.W.

**A82-23170 † The effect of small rectilinear sign-varying accelerations on the mucous membrane of the small intestine of dogs (Vliianie malykh priamolineinykh znakoperemennykh uskorenii na sostoianie slizistoi obolochki tonkoi kishki sobak).** T. V. Gladkii (Odesskii Gosudarstvennyi Universitet, Odessa, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1952, p. 65-71. 20 refs. In Russian.

Experiments carried out on 26 mongrel dogs show that the small intestine undergoes functional changes when subjected to 30 min of rectilinear sign-varying accelerations. The activity of certain enzymes changes, and the lumen of the vascular network in the mucous membrane increases. The number of goblet cells, together with the quantity of secretions, also increases. C.R.

**A82-23171 † The role of the lung in the metabolism of vasoactive substances (Rol' legkogo v metabolizme vazoaktivnykh veshchestv).** O. G. Tishkin and N. A. Temur'iants (Simferopol'skii Gosudarstvennyi Universitet, Simferopol, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 80-85. 42 refs. In Russian.

Among the many well established nonrespiratory functions of the lung, the most important involve the metabolism of vasoactive substances. The present paper reviews the role of the lung in the inactivation of serotonin, noradrenalin, bradykinin and prostaglandins E1, E2 and F2 alpha, the activation of angiotensin I, and the synthesis of angiotensin II, histamine, prostacycline and the SRS-A and ECF-A components of anaphylaxis. The consequent importance of lung metabolism in the anaphylactic reaction and in the development of lung pathologies is pointed out. A.L.W.

**A82-23172 † The effects of cold on catecholamine fluorescence in several structures of the rat brain (Vliianie kholoda na fluorestsentsiiu katekholaminov v nekotorykh strukturakh golovnogo mozga krys).** G. I. Borodaevskaia (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 86-88. 12 refs. In Russian.

**A82-23173 † The response of the microstructure of the cerebral subcommisural organ to a change in light cycle (Reaktsiia mikrostruktur subkomissural'nogo organa mozga na izmenenie svetovogo rezhima).** L. P. Siziakina and E. S. Gul'iants (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 88-90. In Russian.

**A82-23174 † Variation in catecholamine excretion in adolescents under mountain conditions (Izmenenie ekskretsii katekholaminov u podrostkov v usloviiakh vysokogor'ia).** N. N. Nagnibeda and I. M. Vorobei (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 91, 92. 14 refs. In Russian.

**A82-23175 † Use of botanical and vitamin preparations in the prevention of gastric ulcers induced in rats by immobilization, noise and vibration (Preduprezhdenie rastitel'nymi i vitaminnymi preparatami iazv zheludka, vyzyvaemykh vozdeistviem immobilizatsii, shuma i vibratsii, u krys).** N. P. Mashchenko, G. N. Lipkan, and G. N. Voitenko (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 103-106. 17 refs. In Russian.

**A82-23244 * The effects of cutting or of stretching skeletal muscle in vitro on the rates of protein synthesis and degradation.** M. J. Seider, R. Kapp, C.-P. Chen, and F. W. Booth (Texas, University, Houston, TX). *Biochemical Journal*, vol. 188, 1980, p. 247-254. 39 refs. Research supported by the Muscular Dystrophy Association of America; Grant No. PHS-AM-19393; Contract No. NAS9-15388.

Skeletal muscle preparations using cut muscle fibers have often been used in studies of protein metabolism. The present paper reports an investigation of the effect of muscle cutting or stretching in vitro on the rates of protein synthesis and/or degradation. Protein synthesis and content, and ATP and phosphocreatine levels were monitored in soleus and extensor digitorum longus muscles from the rat with various extents of muscle fiber cuts and following stretching to about 120% the resting length. Rates of protein synthesis are found to be significantly lower and protein degradation higher in the cut muscles than in uncut controls, while ATP and phosphocreatine concentrations decreased. Stretched intact muscles, on the other hand, are observed to have higher concentrations of high-energy phosphates than unstretched muscles, while rates of protein degradation were not affected. Results thus demonstrate that the cutting of skeletal muscle fibers alters many aspects of muscle metabolism, and that moderate decreases in ATP concentration do not alter rates of protein concentration in intact muscles in vitro. A.L.W.

**A82-23251 † The role of aldosterone in the regulation of the water and salt balance in hot-shop workers of the metallurgical industry (Ob uchastii al'dosterona v reguliatsii vodno-solevogo balansa u rabochikh goriachikh tsekhov metallurgicheskogo proizvodstva).** V. I. Dorofeeva and A. K. Merzon (II Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Vrachebnoe Delo,* Oct. 1981, p. 104-106. 9 refs. In Russian.

**A82-23252 † The pharmacology of ocular hemodynamics /Review/ (Farmakologiia gemodinamiki glaza /Obzor/).** V. S. Iasnetsov, A. S. Bozhefatov, and N. M. Iasnetsova (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Mar.-Apr. 1981, p. 233-238. 89 refs. In Russian.

The effects of various pharmacological substances on ocular hemodynamics are reviewed in light of the importance of vascular disorders in the pathogenesis of distrophic retinal lesions and decreases in visual function. Particular attention is given to vasodilators with myotropic action, cholinomimetics and anticholinesterases, cholinolytic agents, adrenomimetics, adrenal and sympathetic blockers, local anesthetics, osmotic agents, hormonal preparations, oxygen, and individual substances including radioactive iodine, heparin, prostaglandins and fonurite. A.L.W.

**A82-23253 † Changes in the temporal parameters of visual perception under the influence of psychostimulants (Izmenenie vremennykh parametrov zritel'nogo vospriiatiia v usloviiakh deistviia psikhostimuliatorov).** N. K. Barkov and A. I. Machula (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Institut Obshchei i Sudebnoi Psikhiatrii, Moscow, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Jan.-Feb. 1981, p. 12-14. 5 refs. In Russian.

The effects of small doses of various psychostimulants on the temporal characteristics of visual perception in the cat are investigated. Experiments were performed within the framework of a conditioned response elicited by the presentation of visual stimuli of two types for periods from 500 to 4000 msec. The administration of phenamine (0.2 mg/kg), sydnocarb (1.5 mg/kg) or cocaine (0.5 mg/kg) is observed to increase the percentage of correct stimulus identifications for stimulus durations less than 3 sec, at which all identifications were correct in all circumstances. Catinon, at a dose of 0.5 mg/kg, on the other hand is observed to increase the exposure time required to achieve the same correct response rate. A.L.W.

**A82-23254 † Influence of interactions of hearing and vibratory sensations on the masking effect (Vliianie vzaimodeistviia slukha i vibratsionnoi chuvstvitel'nosti na effekt maskirovki).** M. L. Shapiro (I Gorodskaia Bol'nitsa, Nizhnii Tagil, USSR). *Vestnik Otorinolaringologii,* May-June 1981, p. 13, 14. In Russian.

The influence of interactions of hearing and vibratory sensation on the masking effect of low-frequency noise on auditory perception are investigated. Experiments were performed in which a sound conductor attached to a tuning fork at one end was held against the mastoid processes of subjects sitting in a quiet room or in a chamber with low-frequency background noise. Measurements of auditory thresholds made with the subject grasping and not grasping the sound conductor reveal that the vibratory sensations encountered upon hand contact with the conductor interact with auditory sensations to reduce the masking effects of low-frequency noise on the perception of tuning fork signals. Results may be useful in the understanding of the pathogenesis of noise and vibration induced damage to the auditory analyzer. A.L.W.

**A82-23255 † Vestibulovascular responses in inner ear dysfunction (Vestibulososudistye reaktsii pri disfunktsii vnutrennego ukha).** E. I. Petrova, L. Ia. Andriako, O. A. Buianovskaia, and I. Ia. Iakovleva (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Nov.-Dec. 1981, p. 8-13. 12 refs. In Russian.

Results are presented of comprehensive studies of systemic circulation in patients suffering from attacks of systemic vertigo. Vestibular functions, blood biochemistry and circulatory condition as indicated by arterial pressure dynamics, blood systolic and minute volumes, peripheral resistance and pulse wave propagation rate were evaluated in graded angular acceleration tests on 30 patients with Meniere's disease, and 20 with similar diseases of the labyrinth, induced accompanying cervical osteochondrosis and autonomic vascular dystonia. Three classes of vestibulovascular responses to rotatory stimulation, are found, characterized by (1) increased heart rate and arterial pressure and decreased pulse pressure, analogous to the reactions of normal subjects; (2) reductions in large vessel tonus, pulse wave propagation rate and peripheral resistance and increases in systolic and minute blood volumes, indicative of an inadequate reaction; and (3) hemodynamic disturbances leading to a vestibular crisis. Results demonstrate the efficacy of hemodynamic studies in conjunction with vestibular stimulation in monitoring inner ear dysfunctions. A.L.W.

**A82-23256 † Phase phenomena in the vestibular analyzer - Vestibular recruitment (Fazovye iavleniia v vestibuliarnom analizatore - Vestibuliarnyi rekruitment).** N. S. Blagoveshchenskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* Nov.-Dec. 1981, p. 3-8. 10 refs. In Russian.

It is noted that underlying the concept of vestibular recruitment are vestibular reactions that are inadequate with respect to the strength of the irritation and that can be regarded as phase phenomena. These latter long ago received the attention of the classical school of Soviet physiology (equalizing, paradoxical, inhibitory phases). Since this recruitment is seen with both peripheral and central lesions of the analyzer, it is incorrect to consider its importance local. Vestibular recruitment is especially pronounced in breakdowns of compensating/adaptive mechanisms during the acute and subacute stages of illness. It is noted that electronystagmography makes it possible to accurately determine phase phenomena in the vestibular analyzer. C.R.

**A82-23257 † Changes in the posture of healthy rats after the intracranial introduction of brain extracts from animals with experimental vestibulopathy (Izmeneniia pozy u zdorovykh krys posle intrakranial'nogo vvedeniia ekstraktov mozga zhivotnykh s eksperimental'noi vestibulodatiei).** G. N. Kryzhanovskii, V. K. Lutsenko, M. Iu. Karganov, and V. I. Torshin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Oct. 1981, p. 404-406. 9 refs. In Russian.

The possibility of reproducing a pathological state in healthy animals with extracts from an injured brain is investigated on a model of experimental vestibulopathy. Unilateral lesions of the vestibular system are limited by the Deiters' nucleus. In certain cases hyperactivity is induced and in others the nucleus is broken down; this manifests itself in clinically different types of vestibulopathy. It is noted that, with the model used here, the vestibular rotation syndrome can be clearly seen. C.R.

**A82-23258 † Energy-dependent transport of Ca/2+/ and lipid peroxidation in sarcoplasmatic reticular muscle membranes in hypokinetic rats (Energozavistimyi transport Ca/2+/ i perekisnoe okislenie lipidov v membranakh sarkoplazmaticheskogo retikuluma myshts krys pri gipokinezii).** G. V. Chernysheva, V. I. Mel'nik, and G. G. Amarantova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Nov. 1981, p. 548, 549. 16 refs. In Russian.

**A82-23259 † The condition of pulmonary surfactant and the ultrastructure of the blood-air barrier in acute hypoxia (Sostoianie legochnogo surfaktanta i ul'trastruktura aerogematicheskogo bar'era pri ostroi gipoksii).** K. K. Zaitseva, V. I. Skorik, and S. A. Shliapnikova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 653-656. 18 refs. In Russian.

Results are presented of an evaluation of the condition of the pulmonary surfactant alveolar complex and the ultrastructure of the blood-air barrier under conditions of acute respiratory hypoxia. Lung samples were taken from dogs following 1.5-2 hours of artificial bradypnea and analyzed by histological, electron microscopic and biochemical techniques. The hypoxic dogs are observed to exhibit tendencies towards an increased pulmonary coefficient and to be characterized by a decreased air bubble stability coefficient, a five-fold increase in minimum surface tension and a two-fold decrease in the surface tension stability index. Changes in the shape of the surfactant hysteresis loop are also observed, along with a decrease in phosphatidyl choline levels and an increase in lysophosphatidyl choline. Indications of emphysema, interalveolar septal thickening, epithelial cells and erythrocytes in the alveolar cavities, edema in the interalveolar septa and general signs of air-blood barrier deterioration are also found. Results are interpreted in terms of the peroxidation of the surfactant lipids, the impairment of barrier permeability, the filling in of septal space, and disturbances in type II pneumocyte function. A.L.W.

**A82-23260 † Effects of gravitational atelectases on the expiratory closure of respiratory tracts (Vliianie gravitatsionnykh atelektazov legkikh na ekspiratornoe zakrytie dykhatel'nykh putei).** M. A. Tikhonov and A. V. Kondakov. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Dec. 1981, p. 663-666. 10 refs. In Russian.

The dynamics of the expiratory closure of respiratory tracts during gravitationally induced atelectasis are investigated in a study of the characteristics of regional pulmonary ventilation. Static and dynamic lung capacities, intrapulmonary gas compositions and expiratory airway closure were monitored in nine subjects undergoing centrifugation at +Gz forces of 2 to 8 g while breathing air or pure oxygen. In contrast to acceleration while breathing air, exposure to pure oxygen is found to lead to coughing and discomfort in most subjects, as well as decreases in total and respiratory lung capacities, and forced inspiratory capacity. Indications of ventilatory impairment of the restrictive type due to the appearance of transitory atelectases simultaneous with the development of peripheral bronchial obstructions is also obtained which may be explained by a biomechanical hypothesis. The ventilation impairments have important implications for the development of hypoxemia during acceleration. A.L.W.

**A82-23261 † Preparation of purified erythropoietin from rabbit blood plasma (Poluchenie ochishchennogo eritropoetina iz plazmy krovi krolika).** S. N. Osipova, V. V. Mezhevikin, and I. I. Gitel'zon (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Dec. 1981, p. 688, 689. 11 refs. In Russian.

**A82-23262 † Characteristics of the lifting reflex in albino rats following prolonged space flight /Effects of weightlessness and artificial gravity/ (Osobennosti liftnoi reaktsii u belykh krys posle dlitel'nogo kosmicheskogo poleta /Vliianie nevesomosti i iskusstvennoi sily tiazhesti/).** G. S. Aizikov, A. S. Markin, and A. V. Mokrousova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Dec. 1981, p. 722-725. 7 refs. In Russian.

The effects of prolonged space flight and rotation to simulate normal gravity on the lifting reflex in animals are investigated. The reflex, characterized by limb extension and elevation of the torso upon downward motion in the horizontal position, was evaluated in intact and labyrinthectomized rats before and after flight for 18.5 and 19.0 days on the Cosmos 936 and 1129 biosatellites under conditions of weightlessness or artificial gravity in an onboard centrifuge. Electromyography of the ocular and gastrocnemius muscles and observation of the mechanical component of muscle reaction reveal the lifting reflex to be present in all animals post flight, although the latent time of the reflex as indicated by the mechanical component increased significantly in uncentrifuged animals. A significant weakening of the jump readiness reflex upon downward motion in the head-down position is also observed in rats having experienced artificial gravity or weightlessness. Results suggest that the initial vestibular and-conductive stages in the reflex remain unaltered by weightlessness, which instead influences muscular function. A.L.W.

**A82-23263 † Reactive changes in autonomic synapses upon frequency electrostimulation (Reaktivnye izmeneniia vegetativnykh sinapsov pri ikh chastotnoi elektrostimuliatsii).** O. S. Sotnikov, Iu. P. Pushkarev, and G. A. Zolotareva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Dec. 1981, p. 743-747. 14 refs. In Russian.

Modifications to peripheral autonomic nervous system synapses occurring as a result of high-frequency orthodromal electrical stimulation are investigated in relation to the colloid-chemical transformations of the synaptoplasma produced. Vital phase-contrast microscopy, vital staining and electron microscopy were performed of isolated neurons in the vagosympathetic trunk of the frog and the cervical sympathetic ganglion of the cat during electrical stimulation at a frequency from 20 to 60 pulses/sec for 5-15 min, as well as in electrophysiological controls. Results reveal a rounding of the synaptic buds, an increase in their sizes and a decrease in optical density, decreases in the numbers of dye granules, and a decrease in the numbers of light synaptic vesicles accompanied by the appearance of osmiophilic, myelin-like bodies, dense-core vesicles and glycogen-like granules. The structural changes appearing during the course of electrical stimulation are explained in terms of changes in the colloidal chemistry of the synaptoplasma. A.L.W.

**A82-23264 † The blood plasma protein spectrum of dogs under treatment for hypoxia with the membrane oxygenator Sever-OMR (Belkovyi spektr plazmy krovi sobak v usloviiakh lecheniia gipoksii s pomoshch'iu membrannogo oksigenatora 'Sever-OMR').** V. I. Skorik, E. S. Safonova, B. M. Zelikson, T. V. Bykova, and T. M. Malikova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Mar. 1981, p. 277-279. 11 refs. In Russian.

**A82-23265 † The effects of immobilization of mice of various radiation sensitivities and the shielding of portions of their bone marrow on survival rate and the formation of splenic colonies following irradiation (O vliianii immobilizatsii myshei raznoi radiochuvstvitel'nosti i ekranirovaniia u nikh chasti kostnogo mozga na vyzhivaemost' i obrazovanie kolonii v selezenke posle eobluchenii).** N. F. Gronskaia and G. S. Strelin (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Nov. 1981, p. 544, 545. 8 refs. In Russian.

**A82-23266 † A method for the study of the pharmacodynamics of antianginal drugs with the use of repeated exercise tests (Metod izucheniia farmakodinamiki antianginal'nykh preparatov s pomoshch'iu povtornykh nagruzochnykh testov).** V. A. Nazarenko and S. A. Nikolenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 21, Jan. 1981, p. 64-68. 19 refs. In Russian.

**A82-23267 † Criterion for the evaluation of arterial pressure response to bicycle ergometer exercise during treatment for hypertension (Kriterii otsenki reaktsii arterial'nogo davleniia na veloergometricheskuiu nagruzku v protsesse lecheniia gipertonicheskoi bolezni).** I. P. Zamotaev, E. P. Dechko, and A. V. Alekseenko (Tsentral'naia Klinicheskaia Bol'nitsa; Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Kardiologiia*, vol. 21, Mar. 1981, p. 41-44. 10 refs. In Russian.

**A82-23268 † Changes with age in the cholin- and adrenergic innervation of the human heart (Vozrastnye izmeneniia kholin- i adrenergicheskoi innervatsii serdtsa cheloveka).** R. I. Abraitis, V. S. Vaichekauskas, R. A. Stropus, and K. A. Tamashauskas (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia*, vol. 21, Sept. 1981, p. 106-108. 21 refs. In Russian.

The development of morphological involutions of the autonomic innervation of the human heart and the significance of these changes for the regulation of cardiovascular activity are investigated in histochemical and physiological studies of hearts from accident victims of various ages. It is found that the differentiation of the cholinergic nervous apparatus is complete by the age of 30, with involution of the cholinergic innervation beginning after the age of 50. The adrenergic innervation is observed to be more developed in children, with involution occurring progressively past the age of 30. After the age of 60, the myocardium is completely free of catecholamines. Myocardial sensitivity to adrenalin is found to be practically the same at all ages. It is suggested that involution of the autonomic innervation of the heart might serve as a morphological basis for the study of the neurohumoral regulation of cardiac function. A.L.W.

**A82-23270 † A sino-auricular block with Samoilov-Wenkeback periods - Diagnosis with the aid of an automated analysis of the structure of heart rhythms and clinical assessment (Sinoatrial'naia blokada s periodami Samoilova-Venkebakha: Diagnostika pri pomoshchi avtomaticheskogo analiza struktury serdechnogo ritma i klinicheskaia otsenka).** A. V. Nedostup, A. A. Platonova, and E. A. Bogdanova (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 38-42. 29 refs. In Russian.

**A82-23271 † Changes in regional and central hemodynamics during the treatment of hypertensive patients with obsidan, apressin and their combination (Izmeneniia regionarnoi i tsentral'noi gemodinamiki pri lechenii bol'nykh gipertonicheskoi bolezn'iu obsidanom, apressinom, i ikh kombinatsiei).** E. V. Erina and G. I. Ozokvo (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 14-19. 20 refs. In Russian.

Changes in the parameters of central and regional hemodynamics brought about by the treatment of hypertensives with the beta-blocker obsidan, the vasodilator apressin and a combination of the drugs are investigated. Tetrapolar chest rheography and bipolar rheoencephalography and leg rheography were performed before and during treatment of 80 patients suffering from stage II hypertension with obsidan alone and then combined with apressin after 15-17 days, apressin alone and then combined with obsidan after 15-20 days, or obsidan and apressin simultaneously for up to 45 days. It is found that obsidan reduces cardiac output and elevates peripheral vascular resistance, while apressin lowers vascular tonus and stimulates cardiac activity. Apressin induces an improvement in brain and peripheral circulation, although with a greater asymmetry in brain and leg rheograms, while obsidan treatment leads to a decrease in rheoencephalogram and leg rheogram asymmetry. Finally, the combination of these drugs is observed to reduce the undesirable effects on hemodynamics and potentiate the hypotensive effect. A.L.W.

**A82-23272 † Microcirculatory pathology under conditions of tissue arterial blood flow insufficiency (Patologiia mikrotsirkuliatsii u usloviiakh nedostatochnogo pritoka arterial'noi krovi v tkani).** N. E. Iarygin, T. N. Nikolaeva, and M. B. Chuprunova (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR). *Kardiologiia,* vol. 21, May 1981, p. 26-30. 12 refs. In Russian.

Results are presented of a morphological study of microcirculation under conditions of insufficient arterial blood flow. Observations were made of the condition of the vascular bed in the omentum of infants having died in the first half year of life from congenital heart defects accompanied by hypovolemia in the systemic circulation, and premature newborns having died as a result of primary cardiovascular insufficiency. Changes in vascular morphology are observed which are attributed to the combination of adaptive processes, related to the maximum utilization of the arterioles, the nonequilibrium perfusion of the capillary net, the reduced deposition of blood in the postcapillary and collecting venules and proper levels of peripheral resistance and adequate postcapillary pressure, and pathological processes, including exsanguination and the aggregation and adhesion of blood cells. It is suggested that the pathology observed in the omentum reflects that present in the terminal vessels of the entire systemic circulation. A.L.W.

**A82-23273 † Cybernetic analysis of cardiac rhythm during a graded exercise test in Salyut-6 crew members (Kiberneticheskii analiz serdechnogo ritma pri probe s dozirovannoi fizicheskoi nagruzkoi u chlenov ekipazhei orbital'noi stantsii 'Saliut-6').** R. M. Baevskii, Zh. V. Barsukova, and I. G. Tazetdinov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Kardiologiia,* vol. 21, Nov. 1981, p. 100-104. 19 refs. In Russian.

The technique of cybernetic analysis of cardiac rhythm is applied to the evaluation and prediction of the functional condition of the cosmonaut cardiovascular system during exercise. The analysis was performed on EKG data obtained for the crews of four prolonged expeditions to Salyut-6 during daily bicycle ergometer tests, and consisted of the determination of the statistical parameters of a series of cardiac intervals along with autocorrelation and spectral analysis. Results indicate that adaptation to the conditions of extended space flights is accompanied by regular changes in the controlling systems, which may be used to determine the course of adaptive processes. In particular, indicators of an unfavorable course of adaptation include a significant increase in the stress index during exercise and a decrease in the difference between the values of slow wave power before and after exercise. The adaptive cost is thus shown to depend on flight duration, and complexity, and individual levels of physical training. A.L.W.

**A82-23274 † Modeling interactions between protein molecules - Investigating complexes of indole and its derivatives through infrared spectroscopy (Modelirovanie mezhmolekuliarnykh vzaimodeistvii v belkakh - Izuchenie kompleksov indola i ego proizvodnykh metodom IK-spektroskopii).** V. N. Umetskaia and L. V. Konovalov (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 773-776. 10 refs. In Russian.

**A82-23275 † Photodamage to the rhodopsin molecule - SH-group oxidation (Fotopovrezhdenie molekuly rodopsina - Okislenie SH-grupp).** I. D. Pogozheva, I. B. Fedorovich, M. A. Ostrovskii, and N. M. Emanuel' (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Biofizika,* vol. 26, May-June 1981, p. 398-403. 22 refs. In Russian.

The role of SH-group oxidation in damage to the rhodopsin molecule resulting from intense or prolonged exposure to visible light is investigated. The illumination of rod outer segments from the frog retina by bright light is found to result in the oxidation of the protein as well as lipid components of the photoreceptor membrane, with the degree of oxidation depending on the intensity and duration of irradiation. Estimations of SH-group contents in the membrane indicate that the oxidation of rhodopsin, the most important membrane protein, takes place by the oxidation of thiol groups to form disulphide bonds, which disturb the native conformation of the molecule and lead to protein aggregation. Inhibitors of free radical processes (antioxidants) are found to prevent completely lipid oxidation and reduce protein oxidation. Results also suggest that retinal acts as a photosensitizer of the photoreceptor membrane components to photooxidation. A.L.W.

**A82-23276 † The central hemodynamics of patients with sepsis and acute renal insufficiency (Sostoianie tsentral'noi gemodinamiki u bol'nykh sepsisom i ostroi pochechnoi nedostatochnost'iu).** M. I. Kuzin, V. A. Svetlov, M. I. Sorokina, and A. I. Kolesnikov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 8, 1981, p. 40-45. 14 refs. In Russian.

**A82-23277 † Biological rhythm aspects of adaptation mechanisms (Mekhanizmy adaptatsii v bioritmologicheskom aspekte).** V. N. Reushkin. *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 12, 1981, p. 50-54. 35 refs. In Russian.

Characteristics of an adaptive time-dependent response to an external stimulus are discussed. The response, termed the expectancy reaction, varies with the type and intensity of a single exposure and prepares the organism for a second encounter with the stimulus after a period of 24 hours. The physiological preparation involves the activation of functional reserves, as well as structural adjustments connected with the synthesis of adaptive enzymes and modifications to cellular structures so that tissues and organs taking part in the adaptation process will be subject to less stress. The characteristics of the expectancy reaction suggest the division of the first state of the stress reaction into three phases, as observed in disease pathogenesis. A.L.W.

**A82-23278 † Genetic and individual differences in cardiovascular disturbances in rats during experimental emotional stress (Geneticheskie i individual'nye razlichiia serdechno-sosudistykh narushenii u krys pri eksperimental'nom emotsional'nom stresse).** K. V. Sudakov, V. A. Dushkin, and E. A. Iumatov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 12, 1981, p. 32-39. 27 refs. In Russian.

The role of genetic and individual differences in the determination of susceptibility to cardiovascular disorders under conditions of experimentally induced emotional stress is investigated in noninbred, and the Wistar, August and Beg lines of inbred, rats exposed to acute or chronic immobilization. Measurements of changes in heart rate and arterial pressure during 30-hour immobilization reveal the Wistar rats to be most tolerant to emotional stress, while the August rats exhibit the least tolerance. Prognostic criteria allowing the prediction of cardiovascular disturbances and the possibility of sudden death on the basis of early changes in blood pressure and cardiovascular activity are developed. A significant correlation is also found between motor activity and individual and interline differences in stress tolerance, which allows the separation of individuals into groups of tolerant or predisposed animals. It is also noted that animals with varying degrees of tolerance to emotional stress are found within each genetic line. A.L.W.

**A82-23279** † **The role of sleep in the adaptation system and in the prognosis of psychological readiness of athletes in competition (Rol' sna v sisteme adaptatsii i v prognozirovanii psikhologicheskoi gotovnosti sportsmenov k sorevnovaniiam).** S. A. Razumov, M. A. Vorob'eva, I. P. Gundorova, G. I. Medvedchuk, I. M. Biruk, E. B. Chemodanova (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR), E. Iu. Morozova, and S. G. Dagaev. *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 21-23. 17 refs. In Russian.

**A82-23280** † **The effect of athletic training on the mass distribution of athletes' bodies (Vliianie sportivnoi trenirovki na geometriiu mass tela sportsmenov).** V. N. Seluianov (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 21, 22. 6 refs. In Russian.

**A82-23281** † **Indicators of the T system of immunity during physical overstraining (Nekotorye pokazateli T-sistemy immuniteta pri fizicheskom pereutomlenii).** V. M. Shubik, V. Iu. Viaz'menskii, and I. A. Zykova (Leningradskii Nauchno-Issledovatel'skii Institut Radiatsionnoi Gigieny, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Sept. 1981, p. 28, 29. 8 refs. In Russian.

The condition of the T system of immunity is studied in athletes undergoing intense training. Blood T lymphocyte levels and functioning and reactions to the Mantoux test were evaluated in 114 swimmers aged 12-17 undergoing twice daily training six days a week, and 106 adolescent controls. Whereas no significant differences are found between T lymphocyte levels in the athletes and controls, a considerable reduction in thymidine uptake following lymphocyte culture stimulation with phytohemagglutinin is observed in the athletes relative to the controls, indicating a decreased mitogenic response. A lower proportion of positive reactions to the Mantoux test is also obtained in the swimmers, which supports the existence of an impairment in T-lymphocyte function in intense physical exercise. A.L.W.

**A82-23282** † **Control of the number of discharges of individual motor units in skeletal muscles as a test of coordination in athletes (Upravlenie chislom razriadov otdel'nykh dvigatel'nykh edinits skeletnykh myshts kak test dlia vyiavleniia koordinatsionnykh sposobnostei sportsmenov).** R. M. Gorodnichev, V. V. Diubin, V. K. Spirin, and Iu. T. Shapkov (Moskovskii Oblastnoi Gosudarstvennyi Institut Fizicheskoi Kul'tury, Velikiye Luki; Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 26-28. 10 refs. In Russian.

**A82-23283** † **The role of the vestibular analyzer in the spatial analysis of gymnastic exercises (Rol' vestibuliarnogo analizatora v prostranstvennom analize gimnasticheskikh uprazhnenii).** A. I. Popugaev (Udmurtskii Gosudarstvennyi Universitet, Izhevsk, USSR) and O. P. Panfilov (Khabarovskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Khabarovsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 24, 25. 16 refs. In Russian.

The functioning of the vestibular system in the perception of three-dimensional body displacements during the performance of gymnastic exercises involving body rotation and free flight, when the visual analyzer is temporarily inoperative, is discussed based on a review of literature and observational data. Studies of vestibular analyzer excitation thresholds in gymnasts at various levels are presented which demonstrate that the excitability threshold may be used in the evaluation of the functional condition of the vestibular analyzer. At the same time, nystagmography, together with statokinetic stability, appears to be more informative in the study of the motion capabilities of gymnasts. A.L.W.

**A82-23284** † **The influence of physical stress on the dynamics of work capacity and electrical activity of skeletal muscles in the course of an entire day (Vliianie fizicheskoi nagruzki na dinamiku rabotosposobnosti i elektricheskoi aktivnosti skeletnykh myshts na protiazhenii dnia).** Iu. V. Shcherbina (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 29, 30. In Russian.

**A82-23285** † **The physiological condition of press operators (Sostoianie fiziologicheskikh funktsii u rabochikh-shtampovshchikov).** B. M. Ratsenberg and N. G. Severova. *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 57-59. 7 refs. In Russian.

Results are presented of a study of the physiological functions of workers performing light manual labor characterized by monotony and the necessity of sitting for long periods of time. Press operators were evaluated for heart rate, arterial pressure, visual-motor reaction time, critical flicker fusion and muscular endurance six times during the course of a work shift. The indicators followed are observed to undergo significant variations during the course of work, most notably a slowing of the pulse attributed to monotony, a decrease in critical flicker fusion frequency and increase in reaction time indicating stress on visual-motor functions and a decrease in central nervous system lability, and a decrease in muscle strength indicative of fatigue. Physiological conditions are found to be improved, however, following the institution of improvements in working conditions, including noise reduction, increased illumination, and three additional rest periods, during two of which physical exercises were performed. A.L.W.

**A82-23286** † **Possibility of using recorder systems with a low upper frequency boundary in EMG telemetry (Vozmozhnost' ispol'zovaniia sistem registratorov s nizkoi velichinoi verkhnei granitsy chastoty pri telemetricheskoi peredache EMG).** H. Weber, H.-J. Naumann, and M. Quaas (Medizinische Akademie, Dresden, East Germany). *Gigiena Truda i Professional'nye Zabolevaniia,* Dec. 1981, p. 42, 43. 7 refs. In Russian.

The use of a telemetry system combined with an automatic recorder with a limiting upper frequency of 80 Hz in the remote monitoring of electromyograms is investigated in a study of isometric, isotonic and rhythmic exercises in six healthy men. Comparison of electromyograms recorded by the automatic recorder, a standard electromyograph and a photorecorder reveals all three telemetric approaches to provide sufficient time reproducibility, steadily increasing biopotentials dependent on stress, stable relative scatter and significant linear correlations between muscular tension and electric potentials. Nearly identical EMG parameters demonstrate the potential of both the mechanical and the photorecorder instrument in the recording of EMGs, with the upper limit of 80 Hz sufficient for the quantitative evaluation of physical stresses. A.L.W.

**A82-23287** † **Reaction of the blood system to single and double exposure to a stress agent (Reaktsiia sistemy krovi na odnokratnoe i dvukratnoe vozdeistvie stressornogo agenta).** M. I. Fedotova and O. I. Belousova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Nov.-Dec. 1981, p. 24-27. 7 refs. In Russian.

Experiments were performed on male Wistar rats to study the reaction of the blood system to single and double exposure of immobilization stress (the exposure lasted for six hours and was repeated 6 and 14 days after the initial immobilization). It was found that neutrophilic leukocytosis and lymphopenia were maintained in the blood but were less marked after the repeated immobilization. B.J.

**A82-23288** † **Prediction of shifts in the radiation resistance of animals under the influence of various factors (K voprosu o prognozirovanii sdvigov radiorezistentnosti zhivotnykh pod vliianiem razlichnykh vozdeistvii).** N. I. Arlashchenko and D. Ia. Oparina (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-

Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1981, p. 891-898. 22 refs. In Russian.

Experiments performed on mice and rats showed that shifts in the radiation resistance of animals can be produced through the influence of various irritants which change the initial functional state of the organism. Besides ionizing radiation, the animals were subjected to the effects of gravitational acceleration stress, noise, reduced temperature, and artifical illumination. The results point to the conclusion that the prediction of the radiation-induced damage of animals in the range from mean lethal dose to sublethal doses of ionizing radiation should be based not on the magnitude of the dose but also on the initial functional state of the organism. B.J.

**A82-23289 † The effectiveness of using various radioprotective agents for protecting the genital cells of male mice from the genetic effects of radiation. I - Investigation of the yield of dominant lethal mutations in postspermatogonial cells (Effektivnost' primeneniia razlichnykh radioprotektorov dlia zashchity polovykh kletok samtsov myshei ot geneticheskogo deistviia radiatsii. I - Izuchenie chastoty dominantnykh letal'nykh mutatsii v postspermatogonial'nykh kletkakh).** M. D. Pomerantseva, L. K. Ramaiia, P. G. Zherabchenko, and G. V. Kalistratov (Akademiia Nauk SSSR, Institut Obshchei Genetiki; Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR). *Radiobiologiia,* vol. 21, Sept.-Oct. 1981, p. 722-729. 22 refs. In Russian.

**A82-23290 † Technique for the self-stimulation of subcortical structures in immobilized rats based on biofeedback (Metodika samorazdrazheniia podkorkovykh struktur u obezdvizhennykh krys po printsipu biologicheskoi obratnoi sviazi).** I. Sabo, G. Cherdash, P. Kolta, L. Kelleni, V. A. Puchkov, and V. A. Markevich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Nov.-Dec. 1981, p. 1311-1313. In Russian.

**A82-23291 † Correlation of behavioral rest-activity phases and the characteristics of the spatial organization of cortical potentials in the case of experimental neurosis (Sootnoshenie povedencheskikh faz 'pokoi-aktivnost' i kharakteristiki prostranstvennoi organizatsii potentsialov kory pri eksperimental'nom nevroze).** I. N. Knipst, A. V. Korinevskii, and S. N. Luk'ianova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Jan.-Feb. 1981, p. 86-95. 15 refs. In Russian.

It was found that the development of experimental neurosis in rabbits led to stable changes in the correlation of behavioral rest-activity phases: some activity phases were prolonged while some rest phases were considerably shortened. An analysis of the spatial-temporal organization of cortical potentials showed that these changes were manifested not only in quantitative characteristics of the rest-activity phases but also in their qualitative characteristics. The 'depth' of the rest states was found to decrease in the case of neurosis, and the spatial-temporal characteristics of cortical potentials during the activity phases were disorganized. B.J.

**A82-23294 † The elimination of metabolic products in expired air in relation to the carbon dioxide content in a sealed chamber (Vydelenie produktov zhiznedeiatel'nosti s vydykhaemym vozdukhom v zavisimosti ot soderzhaniia uglekislogo gaza v germoob'emakh).** A. V. Sedov, G. A. Gaziev, N. A. Surovtsev, G. E. Mazneva, L. I. Kobzeva, O. N. Shevkun, and S. V. Bychkov. *Gigiena i Sanitariia,* Oct. 1981, p. 90, 91. In Russian.

The dependence of the rate of the respiratory elimination of metabolic products on the carbon dioxide content in a sealed chamber is investigated in a study of possible toxicological effects and air purification requirements. Rates for the expiration of carbon oxides, methane, methylketones, amino compounds and ammonia were measured in subjects breathing air containing 0.03, 0.5 and 2% CO2. Analysis of the data is used to derive regression equations expressing increases in the respiratory elimination rates of the various compounds with increasing CO2 content. These increases are attributed to the effects of hyperventilation observed in the subjects. A.L.W.

**A82-23295 † Diurnal and seasonal rhythms in adrenal cortex activity in albino rats undergoing physical training (Sutochnye i sezonnye ritmy aktivnosti kory nadpochechnikov u belykh krys pri fizicheskikh trenirovkakh).** Iu. P. Shorin, E. M. Kazin, and G. V. Efremova (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk; Kemerovskii Gosudarstvennyi Universitet, Kemerovo, USSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 49-52. 17 refs. In Russian.

**A82-23296 † Changes of the catecholamine level in epinephrine-synthesizing oblongatal structures of rats, reacting differently to prolonged single immobolization (Izmeneniia urovnia katekholaminov v adrenalinsinteziruiushchikh strukturakh prodolgovatogo mozga krys, razlichnym obrazom reagiruiushchikh na dlitel'nuiu odnorazovuiu immobilizatsiiu).** R. Kvetnansky, T. I. Belova, Z. Oprshalova, and Iu. Chulman (Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 58-63. 18 refs. In Russian.

**A82-23297 † Biological methods for predicting the effectiveness of psychopharmacotherapy applied to patients with schizophrenia /Review/ (Biologicheskie metody prognoza effektivnosti psikhofarmakoterapii bol'nykh shizofreniei /Obzor/).** A. V. Nemtsov and V. V. Kalinin. *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 81, no. 8, 1981, p. 1232-1241. 123 refs. In Russian.

**A82-23298 † Objectives and structure of a radiation safety service in medical institutions (Zadachi i organizatsiia sluzhby radiatsionnoi bezopasnosti v meditsinskikh uchrezhdeniiakh).** G. P. Kochetova, K. P. Kosenkova, M. Ia. Lev, and A. V. Frolova (Ministerstvo Zdravookhraneniia RSFSR, Rentgenoradiologicheskii Institut, Moscow, USSR). *Zdravookhranenie Rossiiskoi Federatsii,* no. 8, 1981, p. 36, 37. In Russian.

**A82-23299 † Vibration sensitivity of workers in the main occupations of shipbuilding (Vibratsionnaia chuvstvitel'nost' u rabochikh osnovnykh professii v sudostroenii).** K. S. Iatsenko, G. A. Trubnikov, Iu. A. Afanas'ev, and V. M. Molokanov (Astrakhanskii Meditsinskii Institut, Astrakhan, USSR). *Sovetskaia Meditsina,* no. 5, 1981, p. 78-80. In Russian.

**A82-23300 † Circadian rhythm of changes of phospholipid content and the activity of nonspecific phosphomonoesterases in the rat liver (Izmenenie soderzhaniia fosfolipidov i aktivnosti nespetsificheskikh fosfomonoesteraz v pecheni krys na protiazhenii sutok).** A. G. Ginovker, L. A. Konovalova, and A. I. Zhikhareva (Tiumenskii Meditsinskii Institut, Tyumen, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* no. 11, 1979, p. 604-607. 14 refs. In Russian.

**A82-23301 † Improving the medical care of navy personnel (Sovershenstvovat' meditsinskoe obespechenie lichnogo sostava Voenno-Morskogo Flota).** N. T. Potemkin. *Voenno-Meditsinskii Zhurnal,* July 1981, p. 8-10. In Russian.

**A82-23302 † The work capacity of seamen under an altered schedule of work and rest (Rabotosposobnost' moriakov v usloviiakh izmenennogo rezhima truda i otdykha).** V. N. Evstaf'ev, L. M. Shafran, and O. Iu. Netudykhatka. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 46, 47. 9 refs. In Russian.

The effect of a 10-hour shift on the work capacity (quantitative and qualitative) of 252 seamen ranging in age from 19 to 45 is investigated. The ships, 10 in all, were at sea for between 15 and 120 days. The longer shift is found to lower the work capacity and to bring about certain physiological changes. However, it is also found that shore leave for a period proportional to that of the voyage removes these deleterious effects. C.R.

**A82-23303 † A system for the rapid operational evaluation of pilot performance (Sistema operativnoi ekspress-otsenki effektivnosti operatorskoi deiatel'nosti letchika).** A. A. Bezbogov, L. I. Mazur, and V. P. Merkulov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 80-84. In Russian.

It is pointed out that simulators and on-board computers offer only limited possibilities for evaluating pilot performance. The principles underlying the construction of an operational, as opposed to analytical, evaluation system are set forth. The system described is shown to provide real-time evaluation provided the data feed rate does not exceed 60 Hz. Higher rates are possible, however, when the number of parameters being processed is decreased. C.R.

**A82-23304** † **A method for automatically evaluating operator performance (Ob odnom metode avtomaticheskoi otsenki effektivnosti operatorskoi deiatel'nosti).** A. A. Bezbogov, L. I. Mazur, and V. P. Merkulov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 76-80. In Russian.

It is pointed out that statistics show human factors to be responsible for a large number of mistakes and that the proportion of these mistakes in showing a tendency to increase. Since the skill of an operator or pilot receiving training in a ground simulator is evaluated by an instructor, subjective elements come into play. The automatic method proposed here is based on statistical standards and involves a comparison, by computer, between actual values and prescribed values. C.R.

**A82-23305** † **An investigation of the visual observations made by cosmonauts under experimental and actual conditions (Issledovanie deiatel'nosti kosmonavta po vizual'nomu nabliudeniiu v eksperimental'nykh i real'nykh usloviiakh).** G. I. Vorob'ev, P. R. Popovich, and L. D. Smirichevskii. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 70-76. In Russian.

In analyzing the visual observations made by cosmonauts, it is found that at least three actions are necessary: searching for the object, preparing the instrument, and recording the observation. Time is lost between each step. The case investigated here involves observation of the earth's surface, the time of observation being a function of orbital velocity, spacecraft altitude, and angle of view. Using both flight data and data from tests carried out in an anechoic chamber, it is found that time is lost to an adaptation period and, toward the end of the flight, to fatigue. To minimize these losses, it is recommended that an allowance be made for fatigue and that the conditions under which preflight training is carried out be as close as possible to actual flight conditions. C.R.

**A82-23306** † **The modeling of operator activity in referenceless space (Osobennosti modelirovaniia deiatel'nosti operatora v bezopornom prostranstve).** Iu. N. Glazkov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 63-69. 6 refs. In Russian.

The mathematical and physical modeling of the rotational and translational motions of cosmonauts in extravehicular space is discussed. Input data to biomechanical models of the cosmonaut-maneuvering unit system are identified, and the necessity of taking into account displacements of the center of mass in calculations of translational motion due to reaction forces is pointed out. Examples are presented of the mathematical modeling of system rotation about the center of mass during arm motion in a wide arc in the sagittal plane, and a gyroscopic system for the orientation and stabilization of the maneuvering unit by the reduction of the sum of kinetic torques. It is pointed out that such mathematical modeling allows the preliminary evaluation of cosmonaut manuevering units. Physical models of open space are then considered which include neutral buoyancy conditions, parabolic flight and specialized appartus simulating various degrees of freedom. It is noted, however, that no modeling methods can provide a complete representation of the actual conditions in open space. A.L.W.

**A82-23307** † **Investigations of the visual identification of abstract spacecraft models (Issledovaniia zritel'nogo opoznaniia abstraktnykh modelei kosmicheskikh ob'ektov).** E. A. Ivanov and A. Ia. Frolov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 30-42. 13 refs. In Russian.

The accuracy of the visual identification of spacecraft is an important factor in the success of a manned space mission. The present paper presents an investigation of the characteristics of the visual perception and identification of spacecraft models consisting of combinations of various plane geometrical shapes. Probabilities and times of correct identification were determined for 12 operators shown sequences of nine brightly illuminated spacecraft models against a black referenceless field, and compared with a generalized identification criterion calculated as a function of the relative prevalence of different identifying features. Correct identifications are observed to decrease and identification time to increase with increasing model complexity, while differences in the identifiability of shapes with the same number of components correlate with the identification criterion. Other features observed to facilitate identification include general external appearance, illumination levels and the condition of the visual analyzer as indicated by the acuity of night vision. A.L.W.

**A82-23310** **Effects of attitudes on the performance of supervisors.** G. C. Kinney (Mitre Corp., McLean, VA). In: Air Traffic Control Association, Annual Fall Conference, 25th, Arlington, VA, October 19-24, 1980, Proceedings. Arlington, VA, Air Traffic Control Association, 1980, p. 25-30.

The effects of certain mental attitudes of team supervisors on the job are considered. Each attitude discussed is related to motives for the attitude. For helpful attitudes, management actions are considered which would support the attitude. For attitudes which are not helpful, actions are suggested which could help to remedy the attitude, or at least diminish its effects on job performance. An attitude, according to the meaning of this term in the investigation, is a tendency for a person to respond favorably or unfavorably to persons, situations, objects, or events. The responses are essentially automatic once an attitude has developed. Attitudes are formed by a person's social class, social groups, schools, families, experiences, and goals. Relations between attitudes and performance are discussed. G.R.

**A82-23370** **A new concept in life support systems - The NGL molecular sieve oxygen generator.** F. Haigh (Normalair-Garrett, Ltd., Yeovil, Somerset, England). *Aircraft Engineering*, vol. 54, Jan. 1982, p. 8-13.

The ion exchange properties that allow zeolite crystals to act as molecular sieves in industrial oxygen-enrichment processes are applied to the construction of an electronically-controlled, on-board oxygen generating system (OBOGS) for military aircraft. Such a system offers unlimited flight time capability, and the elimination of the fire and explosion hazards posed by conventional liquid oxygen life support systems. The molecular sieve oxygen generator (MSOG) supplies oxygen to pilot gas masks at 50-60% concentration, employing microprocessor control valve settings for the triple-molecular sieve beds. System schematics are provided. O.C.

**A82-23400** **Comparison of some technical methods for the evaluation of whole-body vibration.** J.-E. Hansson and B.-O. Wikström (National Board of Occupational Safety and Health, Solna, Sweden). *Ergonomics*, vol. 24, Dec. 1981, p. 953-963. 17 refs.

Physical measurements of vibrations transmitted through the driver's seat to operators of off-road forestry machines are compared with the driver's subjective evaluation of discomfort from vibration in different driving situations. A total of 13 different vibration analysis methods were considered. The investigation consisted of seven studies. The machines were driven on five test tracks, each consisting of six to ten shorter intervals representing easy to moderately difficult terrain conditions. Subjective ratings correlated better with technical evaluations based on the two most dominant vibration directions or all three directions than with only the critical direction. Calculations based on vibration energy in the entire frequency range 1-80 Hz gave better correlation than calculations based on energy in the critical frequency band. The weighted sum of vector method gave the best correlation with subjective ratings. The correlation coefficient for this method was 1-3-octave-band in the critical direction and frequency. (Author)

**A82-23469** **Twenty years of aviation medicine serving civil aviation of the GDR (20 Jahre Luftfahrtmedizin im Dienste der zivilen Luftfahrt der DDR).** J. Kressin (Ministerium für Verkehrswesen, Berlin, East Germany). *Technisch-ökonomische Information der Zivilen Luftfahrt*, vol. 17, no. 3, 1981, p. 125-129. In German.

**A82-23643** † **The statistical structure of EEG rhythm interaction and individual features of brain autoregulation mechanisms (Statisticheskaia struktura vzaimodeistviia ritmov EEG i individual'nye svoistva mekhanizmov samoreguliatsii mozga).** S. I. Soroko and S. S. Bekshaev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1765-1773. 20 refs. In Russian.

An analysis is presented of the statistical characteristics of the time sequence of EEG rhythm variations in different individuals during different mental functions, and their relation to individual characteristics of brain autoregulation mechanisms. Matrices of brain wave transition probabilities were derived from EEGs recorded in 183 healthy subjects at rest with eyes open and closed and during the performance of mental and visual tracking tasks, and compared with the results of tests measuring individual neurodynamic flexibility. The EEG patterns of persons with a high level of neural flexibility are found to be characterized by a functional nucleus, being a dominant rhythm as judged by the number of its connections which acts to stabilize the pattern, in the region of the alpha wave. The functional nucleus is absent in persons with a low degree of nervous system flexibility, and EEG component interactions are equally probable. Changes in brain functions are accompanied by the establishment of new EEG patterns through an intermediary stage also characterized by equally probable interactions. A.L.W.

**A82-23644** † **The effect of the beta-adrenergic blocker propranolol and the tranquilizer seduxen on the structure of natural sleep in the cat (Deistvie beta-adrenoblokatora propranolola i trankvilizatora seduksena na strukturu estestvennogo sna koshki).** A. A. Snisarenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1780-1784. 12 refs. In Russian.

**A82-23645** † **The relation between the spontaneous activity and the dynamic characteristics of the primary afferents of the frog lateral semicircular canal (Sootnoshenie spontannoi aktivnosti i dinamicheskikh kharakteristik pervichnykh afferentov lateral'nogo polukruzhnogo kanala liagushki).** I. V. Orlov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1798-1806. 13 refs. In Russian.

**A82-23646** † **The effects of serotonin on shivering thermogenesis (Vliianie serotonina na sokratitel'nyi termogenez).** N. N. Kudriavtseva (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR) and M. A. Iakimenko (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1862-1865. 9 refs. In Russian.

The role of serotonin in thermoregulatory mechanisms is investigated in a study of shivering thermogenesis in ground squirrels during arousal from hibernation. The intraperitoneal injection of serotonin (10mg/kg) is observed to decrease body temperature in alert squirrels, and prolong the regaining of body heat and muscular electrical activity during arousal from hibernation. The observed inhibition of muscle contractions and thereby heat generation due to serotonin is noted to be twice as great as that induced by the serotonin precursor 5-hydroxytryptophan, indicating that serotonin synthesized during warming was the source of the hypothermic effect. A.L.W.

**A82-23647** † **Seasonal differences in the adaptive changes of the thermal effect of muscle contraction (Sezonnye razlichiia adaptatsionnykh sdvigov teplovogo effekta myshechnogo sokrashcheniia).** L. D. Pchelenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad; Syktyvkarskii Gosudarstvennyi Universitet, Syktyvkar, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1879-1882. 13 refs. In Russian.

The thermal effects of shivering in cold-adapted animals exposed to cold at different seasons of the year are compared. Electrothermometric measurements were made of heat production in a single contraction of diaphragms at 37 C isolated from rats adapted to cold in the spring and summer. In comparison to spring and summer controls, cold-adapted rat muscle showed a 12% increase in heat produced for the same muscle tension in the summer, and a 54% increase in the spring. Similarly, the calorigenic effect of noradrenalin was 36% in the summer group, and 66% in the spring group. It is concluded that cold adaptation during the first month of the spring is more effective with respect to additional heat production during muscle contraction, than summer adaptation, and thus the degree of lowering of muscular efficiency in cold adaptation may be regulated. A.L.W.

**A82-23769** # **Biolpgical effects of space travel /The W. Rupert Turnbull Lecture/.** K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *(Canadian Aeronautics and Space Institute, Annual General Meeting, Montreal, Canada, May 11, 1981.) Canadian Aeronautics and Space Journal,* vol. 27, 3rd Quarter, 1981, p. 195-201. 21 refs.

Prominent human biological problems related to the microgravity environment of space are discussed. The onset of puffy faces and bird legs occurs as a shift in bodily fluids from the lower to upper extremities, and accompanies an up to 12% loss in bodily fluids through urination. The bird legs condition is exacerbated by atrophication due to disuse and can be corrected by exercise. Cardiovascular decompensation is an excessive return of blood volume to the legs after landing, and disappears after several days. Bone demineralization is observed mainly in the feet, at a rate of 100 mg Ca/day, does not display a plateau effect, and, in the case of Skylab crewmembers, will not be totally regenerated after return to earth. Motion sickness is caused by sensory overloads to the vestibular apparatus, a condition which the brain interprets as an ingestion of poison, the remedy to which is vomiting. M.S.K.

**A82-22981** * # **Atmospheres and evolution.** L. Margulis (Boston University, Boston, MA) and J. E. Lovelock (Reading, University, Reading, Berks., England). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 79-100. 24 refs. Research supported by Boston University and Guggenheim Foundation; Grant No. NGR-22-004-025.

Studies concerning the regulation of the earth atmosphere and the relation of atmospheric changes to the evolution of microbial life are reviewed. The improbable nature of the composition of the earth atmosphere in light of the atmospheric compositions of Mars and Venus and equilibrium considerations is pointed out, and evidence for the existence of microbial (procaryotic) life on earth as far back as 3.5 billion years ago is presented. The emergence of eucaryotic life in the Phanerozoic due to evolving symbioses between different procaryotic species is discussed with examples given of present-day symbiotic relationships between bacteria and eucaryotes. The idea that atmospheric gases are kept in balance mainly by the actions of bacterial cells is then considered, and it is argued that species diversity is necessary for the maintenance and origin of life on earth in its present form. A.L.W.

**A82-24030** **The effect of prolonged practice of pursuit eye movement.** H. Wallach (Swarthmore College, Swarthmore, PA), P. Schulman (New York, State University, Utica, NY), and A. O'Leary (Pennsylvania, University, Philadelphia, PA). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 533-539. Grant No. PHS-11089.

Prolonged exposure to reciprocating motion that is tracked by the eyes results in diminished extent of perceived motion. Investigation of this effect showed that it becomes manifest only in perceived motion that is caused by ocular pursuit, but that it is not an eye muscle effect. It may consist in a changed evaluation of eye movements. The results throw some light on the relations between the processes that are caused by different stimuli for motion. (Author)

**A82-24031** **The latency of circular vection during different accelerations of the optokinetic stimulus.** G. A. Melcher and V. Henn (Zürich, Universität, Zurich, Switzerland). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 552-556. 12 refs.

Subjects were seated inside a full-field optokinetic cylinder which was accelerated at values between .1 and 100 deg per sec. Subjects indicated when motion was first detected. Latency for onset of self-motion shows a minimum of around 5 deg per sec and increases for lower and faster accelerations of the visual surround. In the low acceleration range, up to 5 deg per sec, all movement is perceived as circular vection, that is, self-rotation. With higher accelerations, motion of the visual surround is perceived initially; over seconds, this gradually transforms to circular vection. Velocity estimation during low acceleration is better than during comparable vestibular acceleration. During subject rotation in the light, that is, when both the visual and vestibular inputs combine to generate a velocity signal, detection of motion has the shortest latency and represents actual velocity over a wider range than it does with each stimulus alone. (Author)

**A82-24032** **Individual differences in pulse brightness perception.** R. W. Bowen, K. A. Markell (Loyola University, Chicago, IL), R. Sekuler, and C. J. Owsley (Northwestern University, Evanston, IL). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 587-593. 18 refs. NSF Grant No. BNS-78-17779; Grants No. AF-AFOSR-80-0246; No. NIH-AG-01251.

The origins of individual differences in susceptibilities to the Broca-Sulzer effect, upon which a pulse of light of duration 50-150 msec appears brighter than longer or shorter pulses, are investigated. Observers were first classified as Type A (experiencing brightness enhancement for pulses with simultaneous onset and offset with respect to comparison pulses), B (experiencing brightness enhancement for simultaneous offset conditions only) and C (not perceiving brightness enhancement under any conditions), then tested for abilities in brightness estimation, modulation sensitivity to full-field sinusoidal flicker and contrast sensitivity for moving sinusoidal gratings. Differences in observer class are found to be reflected in differences in magnitude estimation, however are not related to flicker and motion sensitivity. It is thus concluded that the three classes of observer differ in the perceptual criteria used in judging the brightness of individual light pulses, rather than in underlying neurophysiological responses. A.L.W.

**A82-24477** † **Evaluation of the psychological compatibility of drivers in a rally team (Otsenka psikhologicheskoi sovmestimosti sportsmenov v ekipazhe avtogonshchikov-rallistov).** V. E. Kagan, V. P. Kolesov, and E. G. Singurindi (Leningradskaia Lesotekhnicheskaia Akademiia, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 11-14. In Russian.

**A82-24478** † **Criteria and the quantitative evaluation of human disturbance tolerance (O kriteriakh i kolichestvennoi otsenke pomekhoustoichivosti cheloveka).** O. N. Mazurov (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 8, 9. 8 refs. In Russian.

Criteria for the quantitative evaluation of the tolerance of a given individual to external disturbing factors during the performance of athletic activities are discussed on the basis of experiments performed on mountain climbers. Evaluations of subject task performance quality were made under natural and laboratory conditions in the presence and absence of distractions represented by the possibility of falling in the first case and electrical stimulation of the skin in the second. The measures of work effectiveness are found to decrease by a factor of two in the presence of disturbances in those subjects preliminarily classified as disturbance intolerant, and remain the same or even increase in those labelled tolerant. Results thus demonstrate changes in work effectiveness to be a reliable indicator of disturbance tolerance in athletes. A.L.W.

**A82-24479** † **Regulation of blood supply in the extremities during exercise in women (Reguliatsiia krovosnabzheniia konechnostei pri fizicheskoi nagruzke u zhenshchin).** P. P. Ozolin', S. O. Plismane, and K. E. Strelis (Latviiski Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Meditsiny; Gosudarstvennyi Politekhnicheskii Institut, Riga, Latvian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 27-29. 8 refs. In Russian.

Changes in blood supply to the extremities with the process of adaptation to physical training are investigated in female athletes. Blood flow in the forearm and calf and arterial pressure were monitored in untrained female students and female athletes before, during and after bicycle ergometer exercise. Data reveal a close agreement between cardiac function and volume blood flow rate in the working and nonworking extremities during rest and submaximal exercises, indicative of regulation by the same mechanism, most likely sympathetic activation. Such a mechanism, occurring to a greater extent in women than in men and acting to induce vascular contraction in both working and nonworking muscles, may explain the observed reduction in the work capacities and endurance of women with respect to men. A.L.W.

**A82-24480** † **Directed training of wrestlers in the biofeedback control of physical work intensity according to heat rate (Napravlennoe obuchenis bortsov. samostoiatel'nomu upravleniiu nagruzkoi v trenirovke po chastote sokrashchenii serdtsa).** Iu. P. Zamiatin and V. P. Poimanov (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Dec. 1981, p. 19, 20. 7 refs. In Russian.

**A82-24481** † **Methodological aspects of studying the immune system in athletes (Metodologicheskie aspekty izucheniia immunnoi sistemy u sportsmenov).** R. S. Suzdal'nitskii, S. N. Kuz'min, I. B. Zhogoleva, B. B. Pershin, V. A. Levando, L. A. Kuz'mina, and V. V. Markov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury; Moskovskii Nauchno-Issledovatel'skii Institut Vaktsin i Syvorotok; Vsesoiuznyi Onkologicheskii Nauchnyi Tsentr, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Nov. 1981, p. 17, 18. 11 refs. In Russian.

A comparative analysis is made of indices of humoral and cellular immunity and of certain factors of natural resistance. Here, blood is taken simultaneously from a vein, earlobe, and finger of each athlete in the study. It is established that blood from any one of these sources is satisfactory for purposes of study. A qualitative evaluation of T and B lymphocytes is necessary only for blood taken from a vein. C.R.

**A82-24482** † **The phase structure in the process by which a system of motions is formed in gymnasts (Fazovaia struktura protsessa formirovaniia sistemy dvizhenii u gimnasta).** N. I. Ponomarev (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) and S. V. Dmitriev (Gor'kovskii Pedagogicheskii Institut, Gorki, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 51-53. In Russian.

**A82-24483** † **Quantitative criteria for evaluating the candidates granted admission and the effectiveness of athletic training among students in institutes of physical culture (Kolichestvennye kriterii otsenki kachestva nabora abiturientov i effektivnosti sportivnoi padgotovki studentov v institute fizicheskoi kul'tury).** Iu. F. Kuramshin and E. A. Losin (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 41-43. In Russian.

**A82-24484** † **A discussion of the nature of sports medicine (K diskussii o predmete sportivnoi meditsiny).** N. D. Graevskaia. *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 47, 48. In Russian.

**A82-24485** † **The importance of carboanhydrase in regulating the acid-base equilibrium during muscular activity (Znachenie karboangidrazy v reguliatsii kislotno-shchelochnogo ravnovesiia pri myshechnoi deiatel'nosti).** V. E. Kal'nitskaia (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 24, 25. In Russian.

**A82-24486** † **A hand-operated electric bicycle ergometer (Elektricheskii veloergometr s ruchnym privodom).** L. A. Dutov, S. A. Bobrov, V. K. Taran, and Iu. A. Golovko (Khar'kovskii Gosudarstvennyi Universitet, Kharkov, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 46-48. In Russian.

It is thought that the manual operation provided for in the design will broaden the range of applications of the ergometer and make it possible to determine the work capacity of an individual in work with the hands or with the hands and feet simultaneously. The test loads range from 0 to 2400 kg-m/min. C.R.

**A82-24487** † **Training athletes to make quick decisions (Trenirovka operativnogo myshleniia sportsmenov).** S. N. Singaevskii and A. A. Krys'kov (Kamenets-Podol'skii Pedagogicheskii Institut, Kamenets-Podolsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 53, 54. In Russian.

**A82-24488** † **Energy supply characteristics and blood protein and electrolyte content during submaximal muscular activity**

**in bicyclists (Pokazateli energoobespecheniia, belkovogo i elektrolitnogo sostava krovi pri myshechnoi rabote submaksimal'noi moshchnosti u velosipedistov).** A. M. Efimenko, N. V. Tolkacheva, V. V. Shiriaev, A. G. Taranets, and O. N. Verbitskii (Simferopol'skii Gosudarstvennyi Universitet, Simferopol, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* June 1981, p. 23, 24. In Russian.

**A82-24489** † **Natural immunity in athletes of different age groups (Sostoianie ostestvennogo immuniteta u sportsmenov raznykh vozrastnykh grupp).** L. S. Umarova (Aktiubinskii Gosudarstvennyi Meditsinskii Institut, Aktiubinsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 26. In Russian.

**A82-24490** † **Vitamins and natural immunity (Vitaminy i estestvennyi immunitet).** K. D. Pletsityi (Akademiia Meditsinskikh Nauk, Moscow, USSR). *Voprosy Pitaniia,* May-June 1981, p. 3-10. 76 refs. In Russian.

The relationship between the supply of vitamins to an organism and the activity of various indices of nonspecific immunity is investigated. Attention is also given to the effect of vitamins on an organism's resistance to various types of infectious agents. The vitamins considered are vitamins C, B1, B2, B6, and B12, folic acid, biotin, pantothenic acid, and vitamins P, E, D, and K. C.R.

**A82-24491** † **The condition of several metabolic processes in operators (Sostoianie nekotorykh obmennykh protsessov u operatorov).** V. I. Smoliar, V. Ia. Bereza, E. S. Portnaia, and O. F. Maksimova (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Pitaniia, Kiev, Ukrainian SSR). *Voprosy Pitaniia,* Nov.-Dec. 1981, p. 35-37. 12 refs. In Russian.

The actual diets and energy expenditures of operators are studied along with components of protein, lipid and vitamin metabolism and cardiovascular and nervous system conditions. Time studies and gas exchange measurements indicate a daily energy expenditure of 2724 kcal in power station control panel operators and railroad dispatchers, which is taken to indicate a caloric requirement of 3000 kcal/day. The actual diets of the operators are found to correspond with their net caloric requirements, however contain less than the recommended amounts of animal proteins, vegetable oils, vitamins A and C and calcium. The performance of operator functions is observed to lead, by the end of the work shift, to significant decreases in operative memory and attention, and increases in visual-motor reaction time. Disorders in lipid and vitamin C metabolism are also found. A.L.W.

**A82-24492** † **The significance of echocardiography in the detection of left ventricular blood supply disorders during bicycle ergometry (Znachenie ekhokardiografii v vyiavlenii narusheniia krovosnabzheniia levogo zheludochka pri veloergometrii).** L. A. Stadniuk, G. V. Ianovskii, Zh. M. Vysotskaia and N. V. Tkhor (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Sept. 1981, p. 49-51. In Russian.

The use of echocardiography for the detection of disorders of coronary circulation in the left ventricle during graded physical exercise is investigated. Echocardiograms and electrocardiograms were recorded simultaneously in normal subjects and in patients suffering from chronic ischemic heart disease and/or hypertension during and following submaximal, step-wise increasing exercise on a bicycle ergometer. Comparison of the data reveals signs of coronary blood supply disturbances to be apparent at lower exercise levels in the echocardiographic recordings of persons with ischemic heart disease. A tendency towards different types of changes in the functional condition of different parts of the myocardium in the presence of S-T segment depression in hypertensives and patients with ischemia suggests that the depression is caused by transient localized myocardial ischemia rather than systolic overloading of the left ventricle. A.L.W.

**A82-24493** † **Neurohumoral regulation of microcirculation in ischemic illness (Neirogumoral'naia reguliatsiia mikrotsirkuliatsii pri vibratsionnoi bolezni).** I. F. Kostiuk and N. N. Mikliaeva (Khar'kovskii Meditsinskii Institut, Khar'kov, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 100-102. In Russian.

**A82-24494** † **Investigation of noise sickness (K diagnostike shumovoi bolezni).** A. N. Grusha (Chernigovskaia Oblastnaia Bol'nitsa, Chernigov, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 102, 103. In Russian.

Experimental results are presented on the pathological effects of noise among 134 industrial workers exposed to 107 dB of high-frequency noise. The characteristics of so-called noise sickness are investigated, which involves the impairment of the auditory analyzer and the nervous system in the form of the asthenic and asthenovegetative syndrome. B.J.

**A82-24495** † **Additional criteria of cerebral hemodynamic disorders limiting physical loads in patients with hypertension (Dopolnitel'nye kriterii narusheniia tserebral'noi gemodinamiki, limitiruiushchie fizicheskuiu nagruzku u bol'nykh gipertonicheskoi bolezn'iu).** A. P. Vinnitskii and A. A. Krishchuk (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* May 1981, p. 63-67. In Russian.

**A82-24496** † **Oxygen supply of the muscle tissue in patients with chronic ischemic heart disease during graded physical loads (Kislorodnoe snabzhenie myshechnoi tkani u bol'nykh khronicheskoi iskhemicheskoi bolezn[illegible] [illegible]tsa pri dozirovannykh fizicheskikh nagruzkakh).** I. V. Da[illegible] [illegible] N. V. Rishko, and V. I. Bogomolets (Ukrainskii Nauchno-[illegible]el'skii Institut Kardiologii; Akademiia Nauk Ukrainskoi SSR, [illegible]titut Fiziologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Oct. 19[illegible], p. 15-18. In Russian.

**A82-24497** † **Changes in peripheral hemodynamics during transient disturbances in cerebral circulation (Izmeneniia perifericheskoi gemodinamiki pri prekhodiashehikh narusheniiakh mozgovogo krovoobrashcheniia).** M. P. Titarenko and L. A. Shurinok (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 22-24. In Russian.

**A82-24498** † **The modeling of membranes and membrane engineering (Modelirovanie membran i membrannaia inzheneriia).** L. D. Bergel'son (Akademiia Nauk SSSR, Institut Bioorganicheskoi Khimii, USSR). *Priroda,* no. 11, 1981, p. 15-23. In Russian.

The construction of artificial membrane structures for the study of the complex processes occurring in biological membranes (membrane modeling) is discussed along with the area of endeavor seeking to alter living membranes so as to affect various levels of cellular behavior. Following a brief review of membrane structure as related to the properties of the phospholipids comprising them, attention is given to the formation of membrane structures in phospholipid solutions, particularly liposomes, consisting of a series of concentric lipid bilayers or a single bilayer. Proteolipsomes, derived by the introduction of proteins are then discussed as models of cellular membranes used in studies of membrane permeability to ions and molecules, and membrane absorption, endocytosis, fusion and lipid transfer upon interactions with cells. Liposome-cellular interactions provide a basis for membrane engineering, the changing of cell properties by the incorporation of foreign substances. Problems and potential applications for the use of liposomes to treat various conditions in the whole organism are also considered. A.L.W.

**A82-24499** † **Sports morphology on the rise /On the work of the Morphological Section at the International Congress 'Sports in Contemporary Society'/ (Sportivnaia morfologiia na pod'eme /O rabote morfologicheskoi sektsii na Vsemirnom Kongresse 'Sport v Sovremennom Obshchestve'/).** B. A. Nikitiuk and F. V. Sudzilovskii. *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Mar. 1981, p. 111-113. In Russian.

**A82-24500** † **Neuromorphological evidence of individual differences in human vision (Neiromorfologicheskoe svidetel'stvo individual'nykh razlichii v zrenii cheloveka).** V. P. Zvorykin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Oct. 1981, p. 21-24. 11 refs. In Russian.

Individual differences in the volumes of brain structures connected with visual functions are investigated as indicators of human visual characteristics. Volumes of the lateral geniculate body on the subcortical level and field 17 (the area striata) on the cortical level were determined in 45 adult human brain hemispheres. Total volumes of the lateral genicular body and field 17 and grey matter

**volumes of the lateral geniculate body are obtained which vary by factors of 2 to 3, significantly more than the total brain mass variation. Results may be interpreted as a neuromorphological basis for the observed variation in visual characteristics between individuals and its genetic predeterminacy.** A.L.W.

**A82-24501 † The functional state of the segmental apparatus of the spinal cord in humans during local work after a short period of rest (Funktsional'noe sostoianie segmentarnogo apparata spinnogo mozga cheloveka pri lokal'noi rabote posle sokrashchennogo otdykha).** V. R. Kuchma (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Dec. 1981, p. 35-39. 16 refs. In Russian.

The excitability of spinal motoneurons and the state of the inhibitory systems of the spinal cord during tiresome local work carried out with 50, 30, and 20% of maximum operating force after varying periods of rest are examined. It is found that shortening the rest period does not affect the dynamics of the indices characterizing the functional state of the segmental apparatus during subsequent work. It is also established that, with a shortened rest period, the changes in the functional indices at the moment of 'refusal' become more pronounced; there are higher levels of spinal motoneuron reflector excitability and a greater suppression of the spinal cord's inhibitory systems during repetitive exertions not preceded by a rest. C.R.

**A82-24502 † Cumulative fatigue over long periods caused by localized muscular movements (O kharaktere kumuliatsii utomleniia v dinamike dlitel'nykh periodov lokal'noi myshechnoi raboty).** O. I. Murav'eva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 25-29. 8 refs. In Russian.

The buildup of fatigue in computer keyboard operators over a day, a week, and a month is investigated. Shifts in electromyographic and dynamometric indices attest the growth of fatigue over a week. Monthly cycles are demonstrated by increases in the amplitudes of electromyograms. Longer vacations and programs of physical exercise at work are recommended. C.R.

**A82-24503 † Clinical-physiological characterization of the auditory-analyzer function of workers of various occupations at the Mikhailovskii concentration mill (Kliniko-fiziologicheskaia kharakteristika funktsii slukhovogo analizatora u nekotorykh professional'nykh grupp Mikhailovskogo Gorno-Obogatitel'nogo Kombinata).** V. A. Uriupin, S. Z. Piskunov, Z. A. Zeveleva, M. V. Banchenko, L. P. Proskurina, and V. P. Shcheglov (Kurskii Meditsinskii Institut, Kursk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 50, 51. In Russian.

**A82-24504 † Certain neurohormonal and blood-coagulation changes in the case of early symptoms of vibration-related pathology in miners (Nekotorye neirogormonal'nye i gemokoaguliatsionnye izmeneniia pri rannikh proiavleniiakh vibratsionnoi patologii u shakhterov).** E. M. Vinarik (Akademiia Meditsinskikh Nauk SSSR, Donetsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 39, 40. In Russian.

**A82-24505 † Progress in the study of occupational diseases at the F. F. Erisman Hygiene Research Institute in Moscow (Razvitie issledovanii po professional'noi patologii v Moskovskom Nauchno-Issledovatel'skom Institute Gigieny im. F. F. Erismana).** A. A. Komarova (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 36-39. In Russian.

**A82-24506 † Certain characteristics of the physiological basis of work-rest regimes for rolling mill operators (Nekotorye osobennosti fiziologicheskogo obosnovaniia rezhimov truda i otdykha operatorov, zaniatykh v nepreryvnykh protsessakh v chernoi metallurgii).** G. T. Chukmasova (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR) and T. N. Polianskaia (Dnepropetrovskii Metallurgicheskii Institut, Dnepropetrovsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Apr. 1981, p. 4-7. 6 refs. In Russian.

**A82-24507 † The differential diagnosis of peripheral vasomotor impairments of vibrational and nonvibrational origin (K differentsial'noi diagnostike perifericheskikh vazomotornykh narushenii vibratsionnogo i nevibratsionnogo geneza).** B. E. Petrenko and M. L. Vydrin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 8-11. 7 refs. In Russian.

Criteria for the differential diagnosis of vascular impairments of vibrational and nonvibrational origins are evaluated based on the dynamic characteristics of vascular responses. Together with usual clinical tests and examinations, a series of specially designed tests including a cold test, an arm raising and lowering test, reactive hyperemia, ischemization of the extremities and local vibration were performed on healthy subjects, and patients with autonomic-vascular dysfunctions, Raynaud's disease and syndrome, polyneuropathies and vibration sickness from the effects of whole-body and local vibration. The continuous recording of forearm rheograms during the cold test, in which subjects immersed their hands in 0 C water, is found to allow dynamic vascular responses to be observed and classified as either normal, distonic hyporeactive, primarily vasospastic and secondarily vasospastic. The latter two types of responses, within the context of the clinical picture, appear to be associated preferentially with vibration-induced impairments, and may thus be used as evidence of a vibrational origin. A.L.W.

**A82-24508 † Working conditions and health of female workers in the sawmill sections of the wood-working industry (Usloviia truda v sostoianie zdorov'ia rabotnits lesopil'nykh tsekhov derevoobrabatyvaiushchei promyshlennosti).** V. F. Rotovitskaia, G. I. Shepel'skaia, and I. I. Solov'ev (Krasnoiarskii Meditsinskii Institut, Krasnoyarsk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 34, 35. In Russian.

**A82-24509 † The use of correlation analysis for the detection of signs of changes in the physiological condition of workers exposed to vibration (Ispol'zovanie korreliatsionnogo analiza dlia vyiavleniia priznakov izmeneniia funktsional'nogo sostoianiia organizma rabochikh vibroopasnykh professii).** N. P. Artamonov (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Oct. 1981, p. 29-31. In Russian.

**A82-24510 † A basis for the optimal duration of work breaks in the presence of noise of various intensities during the course of a work shift (Obosnovanie optimal'nogo vremeni pereryvov pri deistvii shuma razlichnoi intensivnosti v techenie rabochei smeny).** G. S. Zvereva, M. V. Ratner, and T. Ia. Toporets (Akademiia Meditsinskikh Nauk SSSR, Donetsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 46, 47. 6 refs. In Russian.

**A82-24511 † Evaluation of the information content of the clinical signs and the probability of noise sickness (Otsenka informativnosti klinicheskikh priznakov i veriatnosti shumovoi bolezni).** Iu. P. Syromiatnikov (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Aug. 1981, p. 1-4. 12 refs. In Russian.

The information content of various nonspecific clinical signs and diagnosis probability in the detection of noise sickness are examined. Statistical analysis is applied to data concerning the prevalence of reductions in auditory sensitivity, headaches, dizziness, irritability, insomnia, motion discomfort, general hyperhydrosis, changes in skin temperature topography, arterial pressure asymmetry, reduced vibration sensitivity, vestibular sensibilization and hypothalamic dysfunction in patients with varying degrees of noise pathology. The initial stages of noise sickness are found to be polysyndromic, characterized by signs of neurasthenia and disturbances in autonomic and somatic nervous function. These signs often have a scintillating character, and often disappear after rest. The more severe stages of the sickness are accompanied by progressive deafness, increasing blunting of vibration sensitivity, subjective and nervous signs of a more stable nature and signs of hypothalamic dysfunction. A.L.W.

**A82-24512 † Physiological and hygienic evaluation of the work of female tower crane operators (Fiziologo-gigienicheskaia otsenka truda zhenshchin-mashinistov bashennykh kranov).** G. V. Daletskaia (Vsesoiuznyi Nauchno-Metodicheskii Tsentr po Organizatsii Truda i Upravleniia Proizvodstvom, Moscow, USSR) and G. A. Poliakova (Nauchno-Isledovatel'skii Institut Truda, Moscow, USSR).

*Gigiena Truda i Professional'nye Zabolevaniia,* Aug. 1981, p. 27-30. In Russian.

**A82-24513 † The change in certain parameters of operator activity under the influence of alcohol (Izmenenie nekotorykh parametrov operatorskoi deiatel'nosti pod vliianiem alkogolia).** L. Tsaneva and S. Danev. *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 38. In Russian.

The effect of a small amount of alcohol on the ability of workers to understand spoken information under noisy conditions is investigated. Six men and six women (ranging in age up to 23) are tested to measure their ability to hear and speak both before and after consuming 100 g (men) and 50 g (women) of vodka. It is established that the 0.5 percent figure generally regarded as the lowest concentration of alcohol in the blood at which functions of the central nervous system are affected is too high. It is noted that the subjects were not aware of any impaired perception. C.R.

**A82-24514 † An evaluation of the total stress involved in certain types of precision work (Otsenka obshchego rabochego napriazheniia pri nekotorykh kategoriiakh pretsizionnykh rabot).** I. D. Gundareva (Institut Gigieny Truda i Profzabolevanii, Leningrad, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Jan. 1981, p. 39, 40. 12 refs. In Russian.

**A82-24515 † Some indices of the functional physiological state of inspectors at a thermal power plant (Nekotorye pokazateli funktsional'nogo sostoianiia organizma mashinistov-obkhodchikov teplovoi elektrostantsii).** B. S. Mambetaliev, A. D. Dzhailobaev, A. B. Botombekova, and O. T. Kasymov (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Zdravookhranenie Kirgizii,* May-June 1981, p. 24-29. In Russian.

**A82-24516 † Morphofunctional changes in the rabbit myocardium during chronic solar thermal overheating (Morfofunktsional'nye izmeneniia miokarda u krolikov pri khronicheskom solnechno-teplovom peregrevanii).** A. A. Abdyldaev and K. S. Mustafin (Dzhalal-Abadskaia Gorodskaia Bol'nitsa, Dzhalal Abad, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Mar.-Apr. 1981, p. 27-30. In Russian.

Functional, histological and morphological changes in the myocardium under conditions of overheating are investigated in relation to the stage of overheating in the rabbit. Experiments were performed on animals undergoing 60 days of solar heating to produce body temperatures of 40-40.5 and 42-42.5 C. Significant changes in electrocardiogram patterns are observed in both groups of animals which correspond to a focal or diffuse myocardial hypoxia following 60 days of exposure. Reductions in the weight percent of the right ventricle, the ventricular index and the weight percent of the left ventricle with respect to controls are found in the experimental animals and attributed to an impairment in electrolyte metabolism. Histological examinations reveal the presence of micronecrosis and cardiosclerosis the extent of which depends on the length and intensity of exposure. A.L.W.

**A82-24517 † Evaluation of the effectiveness of the complex treatment of patients with ischemic heart disease by the bicycle ergometer method (Otsenka effektivnosti kompleksnogo lecheniia bol'nykh iskhemicheskoi bolezn'iu serdtsa metodom veloergometrii).** Sh. I. Shamenova (Kirgizskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Sept.-Oct. 1981, p. 49-51. In Russian.

**A82-24518 † Phase analysis of peripheral systemic circulation by a rheographic method (Fazovaia otsenka sistemnogo perifericheskogo krovoobrashcheniia reograficheskim metodom).** V. A. Il'in (Kirgizskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Mar.-Apr. 1981, p. 35-40. In Russian.

The simultaneous recording of bulk and differential rheograms is used for the phase analysis of peripheral systemic circulation. The bulk rheogram, its first derivative and the lateral pressure curve in the femoral artery were recorded simultaneously with electrocardiograms or instantaneous blood flow rates in the femoral arteries of dogs. It is found that the combined analysis of bulk and differential rheograms allows the initial point of rheogram rise, the completion of the fast filling phase, the phase of maximal filling and the end points of the fast and slow phases of arterial flow and the venous flow phase to be distinguished. A.L.W.

**A82-24519 † Cardiac function in surgical tuberculosis patients under conditions of prolonged bed rest (Funktsiia serdtsa u bol'nykh kostno-sustavnym tuberkulezom v usloviiakh dlitel'nogo postel'nogo rezhima).** V. P. Zakutaeva and M. I. Poliakova (Kirgizskii Nauchno-Issledovatel'skii Institut Tuberkuleza, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Nov.-Dec. 1981, p. 51-54. In Russian.

**A82-24520 † Characteristics of the functional state of health (K kharakteristike funktsional'nogo sostoianiia zdorov'ia).** K. I. Zhuravleva and V. L. Iaroslavtsev (Leningradskii Sanitarno-Gigienicheskii Institut, Leningrad, USSR). *Sovetskoe Zdravookhranenie,* no. 6, 1981, p. 14-18. In Russian.

**A82-24521 † Criteria for a healthy way of life and prerequisites for establishing it (Kriterii zdorovogo obraza zhizni i predposylki ego formirovaniia).** A. D. Stepanov and D. A. Izutkin (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Sovetskoe Zdravookhranenie,* no. 5, 1981, p. 6-10. In Russian.

**A82-24522 † Morbidity involving a temporary loss of work capacity among drivers of automotive passenger vehicles (Zabolevaemost' s vremennoi utratoi trudosposobnosti voditelei passazhirskogo avtotransporta).** V. D. Zhidkov (Ministerstvo Zdravookhraneniia RSFSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Gorki, USSR). *Sovetskoe Zdravookhranenie,* no. 7, 1981, p. 32-36. 6 refs. In Russian.

**A82-24523 † The fatty acid composition of blood serum from intact rats and rats adapted to hypoxia under the conditions of acute hypoxia (Zhirnokislotnyi sostav syvorotki krovi intaktnykh i adaptirovannykh k gipoksii krys na fone deistviia ostroi gipoksii).** O. R. Grek, A. V. Dolgov, and A. V. Morozov (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, July-Aug. 1981, p. 469-471. 19 refs. In Russian.

**A82-24524 † Effect of regulated muscular load on the morphological and functional characteristics of adrenal glands in dogs with experimental hypocorticalism (Vliianie dozirovannoi myshechnoi nagruzki na morfofunktsional'nuiu kharakteristiku nadpochechnikov sobak s eksperimental'nym gipokortitsizmom).** A. G. Kochetkov (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Problemy Endokrinologii,* vol. 27, July-Aug. 1981, p. 53-58. 19 refs. In Russian.

**A82-24525 † Circadian and seasonal rhythms in plasma androgen levels in the rhesus macaque monkey (Tsirkadnye i sezonnye ritmy soderzhaniia androgenov v plazme krovi obez'ian makak rezusov).** N. P. Goncharov, D. S. Tavadian, and V. I. Vorontsov (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 53-57. 17 refs. In Russian.

**A82-24526 † Intellection and emotions (Myslitel'naia deiatel'nost' i emotsii).** V. E. Klochko and S. M. Dzhakupov. *Voprosy Psikhologii,* May-June 1981, p. 169-171. In Russian.

A monograph on this subject by Vasil'ev et al. (1980) is reviewed. It is noted that certain fundamental conceptions in psychology have prevented investigators from considering the relationship between the emotional and intellectual components of thinking as a topic worthy of serious study. The authors of the monograph see the emotions as forming an internal condition, and therefore playing an important role, in intellection. On the basis of Leont'ev's notion of activity as a system having its own structure, internal transitions, and development, the authors seek to lay the foundation for a systems approach. Such an approach, it is noted, would make it possible to investigate the principles governing the inception and operation of emotional phenomena during intellection. C.R.

**A82-24527 † A device for laboratory investigations of**

**technical-diagnostic activity (Ustroistvo dlia laboratornogo issledovaniia tekhniko-diagnosticheskoi deiatel'nosti).** A. F. Anufriev. *Voprosy Psikhologii,* Sept.-Oct. 1981, p. 143-145. 5 refs. In Russian.

A device is described for investigating, under laboratory conditions, the way in which workers analyze problems encountered in the production of timepieces. Just as on the shop floor, the device makes it possible to verify an analysis in two ways: either by examining the element suspected of causing the problem or by checking the quality of parts produced after the suspected element is replaced. C.R.

**A82-24528 † Establishing methods of investigating individual characteristics of making decisions in situations of conflict (K obosnovaniiu metodiki issledovaniia individual'nykh osobennostei priniatiia reshenii v konfliktnykh situatsiiakh).** A. N. Kovalev. *Voprosy Psikhologii,* July-Aug. 1981, p. 127-131. 12 refs. In Russian.

It is noted that the technical means at man's disposal for executing decisions far exceed his ability to arrive at decisions in a timely and judicious manner. It is thought that mathematical methods and computers may be useful in studying the way in which decisions are made under various circumstances, including those of conflict. The mathematical theory of games, however, either ignores individual psychological factors altogether or else treats them in a general way. The experiment described here is based on a game played with a computer that can act as either a friend or enemy. The program permits an analysis of individual responses to situations of conflict. C.R.

**A82-24529 † Psychophysiological characteristics of the fatigue state based on activation indicators (Psikhofiziologicheskaia kharakteristika sostoianiia utomleniia na osnove pokazatelei aktivatsii).** G. A. Striukov (Gor'kovskii Gosudarstvennyi Universitet, Gorki, USSR), O. A. Konopkin (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR), and T. N. Dolgolenko. *Voprosy Psikhologii,* May-June 1981, p. 38-48. 22 refs. In Russian.

**A82-24530 † A mediation method for solving problems of 'quick-wittedness' (O sposobe oposredstvovaniia pesheniia zadach na 'soobrazhenie').** B. D. El'konin. *Voprosy Psikhologii,* Jan.-Feb. 1981, p. 110-118. 17 refs. In Russian.

The possibility of transition from immediate to mediated solving of quick-wittedness problems is considered. Mediation here is defined as the mediation of the transition between the conditions and goal of the problem. The object where this transition occurs represents the content of the orienting activity in the solving of quick-wittedness problems. It is shown that this object can be constructed only when the trajectory of operations required by the problem can be represented as an entity to be transformed. In this case, the data appear not as a set of separate cues for required operations but as an object, different transformations of which afford different trajectories of the required operation. B.J.

**A82-24531 † The relationship between the individual properties of a human operator and work efficiency and tolerance to the monotony of work (Sviaz' individual'nykh svoistv cheloveka-operatora s produktivnost'iu deiatel'nosti i ustoichivost'iu k vliianiiu faktora monotonnosti truda).** Iu. V. Bushov and Iu. A. Riabchuk (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR). *Voprosy Psikhologii,* Jan.-Feb. 1982, p. 126-130. 15 refs. In Russian.

**A82-24532 † Human predictive ability in univocally determined situations for normal and pathological states (Prognosticheskaia geiatel'nost' cheloveka v odnoznachno-determinirovannykh sredakh v norme i patologii).** A. Iu. Akopov (Psikhonevrologicheskii Dispanser, Leningrad, USSR) and F. I. Sluchevskii (Leningradskii Gosudarstvennyi Meditsinskii Institut, Leningrad, USSR). *Voprosy Psikhologii,* May-June 1981, p. 119-123. 7 refs. In Russian.

**A82-24533 † The dependence of the strategy by which a solution is sought on the type of intellection (Zavisimost' strategii poiska resheniia ot tipa myshleniia).** V. S. Goncharov. *Voprosy Psikhologii,* July-Aug. 1981, p. 132-136. 11 refs. In Russian.

The investigation is carried out in two stages. First the type of intellection is determined, then the game method is used in studying the features characterizing the search for a solution. The two types of intellection - theoretical and empirical - derive from research done by Davydov (1972). The three components of theoretical intellection are analysis, reflection, and an internal plan of action. It is shown that theoretical and empirical ways of thinking lead to different ways of pursuing solutions. The three components of the theoretical type are shown to have a marked effect on the way a solution is sought. C.R.

**A82-24534 † Determination of oxygen content in air on the basis of meterological parameters /pressure, temperature, and moisture/ in order to predict the hypoxic effect of the atmosphere (Opredelenie soderzhaniia kisloroda v atmosfernom vozdukhe na osnove meteorologicheskikh parametrov /davleniia, temperatury, vlazhnosti/ s tsel'iu prognozirovaniia gipoksicheskogo effekta atmosfery).** V. F. Oucharova (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Mar.-Apr. 1981, p. 29-34. In Russian.

**A82-24535 † Features of biorhythms for patients with chronic nonspecific pulmonary diseases during adaptation to the climato-geographic conditions of the Crimea (Osobennosti biologicheskikh ritmov u bol'nykh s khronicheskimi nespetsificheskimi zabolevaniiami legkikh v protsesse adaptatsii k klimatogeograficheskim usloviiam Kryma).** V. P. Piatkin, G. E. Butenko, V. L. Semenov, N. F. Kostin, and R. V. Fedoriv (Ialtinskii Nauchno-Issledovatel'skii Institut Fizicheskikh Metodbv Lecheniia i Meditsinskoi Klimatologii, Yalta, Ukrainian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Nov.-Dec. 1981, p. 5-10. 12 refs. In Russian.

**A82-24536 † Chronobiological aspects in the science of health resorts and physiotherapy (Khronobiologicheskie aspekty v kurortologii i fizioterapii).** I. E. Oranskii (Sverdlovskii Institut Kurortologii i Fizioterapii, Sverdlovsk, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Nov.-Dec. 1981, p. 1-5. In Russian.

Implications of biological rhythms for physiotherapy and treatments at health resorts are discussed. The temporal characteristics of various physiological parameters in healthy and ill persons are outlined and the potential role of physiotherapy in the restoration of biological rhythms disrupted by disease and in the facilitation of adaptation processes is pointed out. Differences in the dynamics of the rhythms of different functions and the indeterminacy of their responses to effecting factors are discussed in light of experiments on nitroglycerin electrophoresis in patients with chronic ischemic heart disease. It is noted that the chronobiological approach is important not only for the study of the mechanisms of the adaptive effects of physical therapy, but has great practical significance, particularly in the development of treatment schedules, the seasonal prevention and treatment of illness and the readjustment of physiological functions following travel between time zones. A.L.W.

**A82-24537 † Individual variability in reaction norms and population adaptation (Individual'naia izmenchivost' normy reaktsii i adaptatsiia populiatsii).** A. S. Severtsov and G. S. Surova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Mar.-Apr. 1981, p. 181-192. 22 refs. In Russian.

The variability of the reaction norms of individuals and populations under various environmental circumstances is investigated based on studies of growth rate in Rana temporaria tadpoles. Individuals were grown from eggs under different conditions of temperature, illumination and population composition, and body size and degree of development were analyzed to determine the heritability of the growth rate characteristic. The individual variations observed are accounted for by individual ranges of the reaction norms and the deviation of the mean individual norm from that of the population. The wide range of reaction norms within the population thus reflects its genotypic heterogeneity. The plasticity of the characteristic is considered to ensure the adaptability of the peak and side groups in the growth rate distribution, while the width of the norm ensures the ecological and evolutionary plasticity of the population as a whole. A.L.W.

**A82-24538 † The effect of the evolution of inherited characteristics on the stability of a predator-prey system - A mathematical model (Vliianie evoliutsii nasledstvennykh priznakov**

**na ustoichivost' sistemy khishchnik-zhertva - Matematicheskaia model').** B. G. Kovrov and L. G. Kosolapova (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Sept.-Oct. 1981, p. 780-790. 13 refs. In Russian.

**A82-24539** † **The stability of a very simple freshwater ecosystem model (Ustoichivost' prosteishei modeli vodnoi ekosistemy).** A. A. Voinov and Iu. M. Svirezhev (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Nov.-Dec. 1981, p. 936-940. 7 refs. In Russian.

**A82-24540** † **This strange cochlea (Eta strannaia ulitka).** E. Sorokin. *Tekhnika i Nauka,* no. 10, 1981, p. 11-13. In Russian.

A popular account is given of laboratory experiments on the cochlea. A structural diagram of the cochlea is presented, and consideration is given to an electrical analog ('long line') model of its functioning. B.J.

**A82-24541** † **Age norms of cardiac chamber volumetric parameters (Vozrastnye normy ob'emnykh pokazatei kamer serdtsa).** N. A. Chigogidze, T. N. Vaulina, and S. V. Kirakosian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Patologii,* vol. 43, no. 9, 1981, p. 69-71. 6 refs. In Russian.

**A82-24542** † **Changes in the activity of kidney enzymes during temporary ischemia of the extremities (Izmeneniia aktivnosti fermentov pochek pri vremennoi ishemii konechnostei).** G. A. Chakareva, O. D. Mishnev, T. S. Serdobintseva, and N. P. Istomin (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Arkhiv Patologii,* vol. 43, no. 8, 1981, p. 27-34. 29 refs. In Russian.

**A82-24543** † **A comparative study of the effects of constant and intermittent noise on the acoustic analyzer (Sravnitel'noe izuchenie deistviia postoiannogo i nepostoiannogo shuma na slukhovoi analizator).** V. V. Mukhin (Donetskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Gigiena i Sanitariia,* Dec. 1981, p. 60, 61. 10 refs. In Russian.

**A82-24544** † **The effects of noise on the physiological condition of blood leucocytes (Vliianie shuma na funktsional'noe sostoianie leikotsitov krovi).** O. P. Lomov and E. V. Tatarinova. *Gigiena i Sanitariia,* Dec. 1981, p. 22-24. 14 refs. In Russian.

The phagocytic activities and glycogen contents of blood leucocytes of persons exposed to various noise levels are studied. Exposure to noise at an equivalent sound level of 95 dBA is found to be accompanied by significant increases in phagocytic number and phagocytic index 4 h after noise exposure, but sharp reductions in leucocyte phagocytic activity and a marked tendency towards reduced neutrophil glycogen saturation on the fifth day of exposure, indicative of a serious reduction in immunobiological potential. In contrast, prolonged exposure to noise at 80 dBA leads to an elevation in immunobiological reactiveness in 30 days after an insignificant initial decline. Correlation analysis of the numbers of segmented neutrophils, the phagocytic index and number, and the mean cytochemical glycogen coefficient suggests that the number of blood leucocytes is determined by their physiological condition.
A.L.W.

**A82-24545** † **The role of multiple recording devices in the complex equipping of functional-diagnostic facilities (Rol' poligrafov v kompleksnom osnashchenii otdelenii funktsional'noi diagnostiki).** A. G. Tishchenko and L. A. Shuster (Nauchno-Proizvodstvennoe Ob'edinenie Radioelektronnoi Meditsinskoi Apparatury, Lvov, Ukrainian SSR). *Meditsinskaia Tekhnika,* Jan.-Feb. 1981, p. 44-46. 6 refs. In Russian.

A description is given of multiple recording devices: four, six, and eight channel multifunctional diagnostic complexes. The devices provide for the following types of diagnostic recordings: EKG, echo cardiography, sphygmography, EEG, thoracoscopy, and recording of the skin galvanic response. B.J.

**A82-24546** † **A complex of instruments for psychophysiological studies (Kompleks priborov dlia psikhofiziologicheskikh issledovanii).** A. I. Vishniakov and E. V. Matveev (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Meditsinskaia Tekhnika,* Jan.-Feb. 1981, p. 14-17. 5 refs. In Russian.

The PFK-01 instrument complex has been developed for the more efficient practical application of psychophysiological examination methods in a network of therapeutic-prophylactic and polyclinical establishments. The complex is based on a programmable keyboard computer and is used to process data obtained by 12 psychophysiological methods. A block diagram of the complex is presented. B.J.

**A82-24547** † **Combined rehabilitative and therapeutic measures in space medicine (Kompleksnye vosstanovitel'no-lechebnye meropriiatiia v kosmicheskoi meditsine).** T. N. Krupina, A. V. Beregovkin, V. M. Bogoliubov, B. M. Fedorov, A. D. Egorov, A. Ia. Tizul, V. V. Bogomolov, V. V. Kalinichenko, A. P. Ragulin, and V. A. Stepin. *Sovetskaia Meditsina,* no. 12, 1981, p. 3-8. 13 refs. In Russian.

Means and methods developed for the treatment of physiological disorders induced by extended space flights are discussed. The procedures were formulated on the basis of ground-based experiments on antiorthostatic hypokinesia for periods of 49 and 182 days, and experience with the treatment of cosmonauts following space flights of 140- and 175-day durations. Taking into account the etiopathological characteristics of the disorders encountered, the rehabilitative process is founded primarily on functional therapy, including therapeutic physical exercises, massage, dosed walking, physical training and balneological and thermal procedures. These procedures are employed differentially, first in the mild, then in the mild-training and training stages of the rehabilitative process in combination with rational psychotherapy. A.L.W.

**A82-24548** † **Application of electrogustometry for the evaluation of adrenal functional conditions (Primenenie elektrogustometrii dlia otsenki funktsional'nogo sostoianiia nadpochechnikov).** E. Sh. Khalfen and A. D. Triapyshko (Saratovskii Meditsinskii Institut, Saratov, USSR). *Kazanskii Meditsinskii Zhurnal,* vol. 62, Sept.-Oct. 1981, p. 34-36. In Russian.

The use of electrogustometry, whereby gustatory sensations are induced by the passage of a constant electric current from the tip of the tongue to the right arm, for the detection of adrenal insufficiency is studied. Measurements of the applied current at which the gustatory sensation disappears were made in 400 healthy persons and 270 patients with an apparatus employing a circuit voltage of 4.5 V and additional resistance of 100 kiloohms. Moderate decreases in critical current were found in 18 and sharp decreases in 25 of the patients in comparison with the healthy subjects and remaining patients. Analysis of blood glucose levels, levels of sodium and potassium in the saliva and blood serum and 17-ketosteroid excretion reveal all patients exhibiting low electrogustometric indicators to have signs of secondary adrenal insufficiency, although not all patients testing normal are without it. Results thus indicate that electrogustometry may be used as a simple preliminary method for the detection of adrenal insufficiency. A.L.W.

**A82-24549** † **Morphometric analysis of ultrastructural changes in the skeletal muscles during physical exercise in acute and chronic experiments (Morfometricheskii analiz ul'trastrukturnykh sdvigov v skeletnykh myshtsakh pri fizicheskikh nagruzkakh v ostrom i khronicheskom eksperimente).** M. D. Shmerling, E. E. Filiushina, and I. I. Buzueva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk,* Apr. 1981, p. 124-130. 20 refs. In Russian.

Changes in the morphologies of the subcellular components of skeletal muscle cells as a result of physical exercise of various durations and intensities are investigated in rats undergoing daily treadmill running to exhaustion for three days and physical exercise of increasing intensity over the course of 40 days. Electron microscopic examination of the tibialis anterior muscle following maximal exercise reveals ultrastructural changes in the morphometric characteristics of the sarcoplasmic reticulum and glycogen stores reflecting the sudden mobilization and exhaustion of intracellular reserves. The white, fast-twitch muscle fibers are observed to be more sensitive to these effects than the red, slow-twitch fibers. Prolonged physical exercise, on the other hand, is observed to produce, particularly in the red muscle fibers, ultrastructural changes in sarcoplasmic reticulum, mitochondria and glycogen stores character-

istic of elevated muscular work capacity and fatigue tolerance.
A.L.W.

**A82-24550 † Changes in blood sodium and potassium concentrations during emotional stress induced by nociceptive stimuli in rats (Izmenenie kontsentratsii natriia i kaliia v krovi pri emotsional'nom stresse, vyzvannom bolevym razdrazheniem krys).** N. A. Gzirishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Izvestiia, Seriia Biologicheskaia,* vol. 6, no. 6, 1980, p. 485-492. 20 refs. In Russian.

**A82-24551 † Mechanism of the effects of vacuum on microorganisms (O mekhanizme deistviia vakuuma na mikroorganizmy).** A. A. Imshenetskii, S. V. Lysenko, N. F. Pisarenko, and N. L. Velikanov (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). *Mikrobiologiia,* vol. 50, Sept.-Oct. 1981, p. 786-791. In Russian.

The mechanisms for the effects of high vacuum on vacuum-tolerant and vacuum-intolerant microorganisms are investigated in light of the importance of the vacuum environment for the space transport of microbial life forms. Experiments involved the exposure of preliminarily desiccated and moist bacterial (Mycobacterium luteum, Serratia marescens) and yeast (Endomyces magnusii) cells to a vacuum of 0.00005 torr for 15 and 30 min. The survival rates of both the intolerant (E. magnusii, S. marescens) and tolerant (M. luteum) species are found to be greater when vacuum exposure is preceded by desiccation. Microscopic examination confirms the effects of water in cell destruction, revealing the effects of saturated water vapor and ice crystals in cell expansion and eventual rupture. Dehydration is also shown to play a significant role in cell death.
A.L.W.

**A82-24552 † Pathogenesis and prevention of the hypoxic contraction of the heart (Patogenez i preduprezhdenie gipoksicheskoi kontraktury serdtsa).** F. Z. Meerson and N. A. Abdikaliev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Apr. 1981, p. 60-67. 24 refs. In Russian.

**A82-24553 † The prognostic value of the central hemodynamic parameters in patients with acute myocardial infarction (Prognosticheskoe znachenie opredeleniia pokazatelei tsentral'noi gemodinamiki u bol'nykh ostrym infarktom miokarda).** Iu. A. Karpov and N. A. Gratsianskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Dec. 1981, p. 27-33. 21 refs. In Russian.

**A82-24554 † The isoenzyme spectrum of serum lactate dehydrogenase as a function of age in healthy individuals (Izofermentnyi spektr syvorotochkoi laktatdegidrogenazy v vozrastnom aspekte u prakticheski zdorovykh liudei).** M. Ia. Beliaev (I Kazanskii Institut Usovershenstvovaniia Vrachei, Kazan, USSR). *Laboratornoe Delo,* no. 3, 1981, p. 152-154. In Russian.

**A82-24555 † Lipid levels in the bone marrow megakaryocytes and thrombocytes of healthy people (Soderzhanie lipidov v megakariotsitakh i trombotsitakh kostnogo mozga zdorovykh liudei).** T. V. Tkacheva (Kirovskii Nauchno-Issledovatel'skii Institut Pereliuvaniia, Krovi, USSR) and N. I. Roganova (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Laboratornoe Delo,* no. 9, 1981, p. 520, 521. 6 refs. In Russian.

**A82-24556 † Beta-acetylglucosaminidase and alpha-mannosidase activity in the blood serum of healthy people of different blood groups (Aktivnost' Beta-atsetilgliukozaminidazy i alpha-mannozidazy v syvorotke krovi zdorovykh liudei s razlichnymi gruppami krovi).** I. Ts. Apostolov and I. I. Kalpazanov (Meditsinska Akademiia, Sofia, Bulgaria). *Laboratornoe Delo,* no. 7, 1981, p. 422-425. 21 refs. In Russian.

**A82-24557 † A mechanism for the stimulation of the immune response under the influence of high ambient temperature (Mekhanizm stimuliatsii immunnogo otveta pri deistvii na organizm vysokoi vneshnei temperatury).** L. G. Prokopenko and Iu. O. Iakhontov (Kurskii Meditsinskii Institut, Kursk, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Nov.-Dec. 1981, p. 62-66. 15 refs. In Russian.

The mechanism for the observed adjuvant properties of erythrocytes taken from heat-exposed animals is investigated. In a first series of experiments, erythrocytes taken from intact rats were treated with serum taken from rats exposed to daily 40-min intervals at 40 C and injected into syngenic rats together with sheep erythrocytes as antigens. Levels of the immune responses, as indicated by rosetta-cell formation in the spleen and serum antibody-forming cell levels, were increased markedly by the treatment of native erythrocytes with serum from heat-exposed rats. In a second series of experiments, treatment of erythrocytes from heat-exposed rats with serum from intact rats incubated with the polyvalent protease inhibitor trasylol is found to prevent the appearance of the adjuvant properties of the erythrocytes. Results suggest that the modification of erythrocyte surface structures by a serum factor represents a step in the multistage process of immune response stimulation following heat exposure. A.L.W.

**A82-24558 † The biological significance of physiological hypoxemia (O biologicheskom znachenii fiziologicheskoi gipoksemii).** S. I. Frankshtein, Z. N. Sergeeva, and L. N. Sergeeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Mar. 1981, p. 263-265. 18 refs. In Russian.

Mechanisms of respiratory control related to blood oxygenation are investigated in studies of the effects of oxygen pre-breathing. Experiments involved the measurement of diaphragm muscular activity in rabbits during the complete obstruction of respiratory pathways. Whereas the breathing of air prior to the closing of the tracheotomy tube is observed to lead to increased breathing muscle activity, oxygen pre-breathing for 1 min prior to closing weakens and slows breathing and suppresses the ventilatory response to airway obstruction. Results indicate that a decrease in the excitability of the respiratory center induced by hyperoxia prevents the reaction of the respiratory center, and suggest changes in blood gases during the obstruction of respiratory pathways. Hypoxemia in the norm is thus concluded not only to play a part in the ventilatory reflex to exercise and increased respiratory resistance, but to induce respiratory discomfort leading to the voluntary enhancement of respiration.
A.L.W.

**A82-24559 † Correlation of the stress protective and autonomotropic effects of mebicar (Korreliatsiia stress-protektivnogo i vegetotropnogo deistviia mebikara).** A. V. Bal'dman, I. V. Zaikonnikova, M. M. Kozlovskaia, I. E. Zimakova, M. F. Bravkov, V. P. Poshivalov, and S. V. Kirshin (Akademiia Meditsinskikh Nauk SSSR, Moscow; Kazanskii Meditsinskii Institut, Kazan; I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Jan.-Feb. 1981, p. 47-49. 8 refs. In Russian.

The relation of the behavioral effects of the tranquilizer mebicar, a tetra-N-alkyl bicyclic bis-urea derivative, with its effects on the somatic and autonomic manifestations of the stress response are investigated. Measurements of hemodynamic baroreflex and respiratory parameters and behavioral changes were made in cats under acute emotional stress induced by encounter with a dog, and in rats under isolation or immobilization stresses. The administration of mebicar at doses from 100 to 300 mg/kg is observed to inhibit the autonomic components of the acute emotional stress response in cats, including hypertension and degradations in central baroreflex control, accompanied by a reduction in emotional and behavioral responsivity. Equivalent tranquilizing doses in rats normalize disturbances in individual and intraspecies behavior induced by prolonged isolation, and reduce the degree of ulcerous damage to the stomach during immobilization stress. A.L.W.

**A82-24560 † Effects of vitamin P on the enzyme spectrum of the blood serum of irradiated animals (Vliianie vitamina P na fermentnyi spektr syvorotki krovi obluchennykh zhivotnykh).** V. M. Varvashtian, M. A. Orozov, and L. G. Gromova (Akademiia Nauk Kirgizskoi SSR, Institut Organicheskoi Khimii, Frunze, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* no. 1, 1981, p. 62, 63. 13 refs. In Russian.

The effects of the daily injection of vitamin P on the serum enzyme concentrations of animals suffering from radiation sickness are investigated. Activities of serum aldolase, aspartate and alanine aminotransferases, and cholinesterase were determined in rats exposed to a single dose of 250 r of X radiation. The resulting radiation sickness is accompanied by 30-60% increases in enzyme activities, with the exception of cholinesterase by the 14th day following irradiation. The administration of daily doses of rutin or a flavonoid preparation isolated from the caper plant is observed to normalize the enzyme levels of irradiated animals without causing hemorrhaging of the internal organs upon dissection. Both preparations are thus concluded to have similer effects in reducing the permeability of vescular walls. A.L.W.

**A82-24561** † **Stereotactic biopsy of brain tumors based on computerized tomography (Stereotaksicheskaia biopsiia opukholei golovnogo mozga s ispol'zovaniem komp'iuternoi tomografii).** E. I. Kandel', S. B. Vavilov, V. V. Peresedov, and A. S. Saribekian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Neirokhirurgii*, July-Aug. 1981, p. 3-8. 16 refs. In Russian.

**A82-24799** **Suprachiasmatic stimulation phase shifts rodent circadian rhythms.** B. Rusak (Dalhousie University, Halifax, Nova Scotia, Canada) and G. Groos (Leiden, Rijksuniversiteit, Leiden, Netherlands). *Science*, vol. 215, Mar. 12, 1982, p. 1407-1409. 15 refs. Research supported by the Nederlandse Organisatie voor Zuiver Wetenschappelijk Onderzoek; Natural Sciences and Engineering Research Council of Canada Grant No. A-0305.

The integrity of the suprachiasmatic nuclei (SCN) of the hypothalamus is essential to the expression of normal circadian rhythms in rodents. Electrical stimulation of the SCN caused phase shifts and period changes in the freerunning feeding rhythms of rats and activity rhythms of hamsters. The phase response curve for SCN stimulation appears to parallel that for light pulses. These findings strengthen the hypothesis derived from lesion studies that the SCN are the dominant light-entrained oscillators in the rodent circadian system. (Author)

**A82-24800** **Onset and offset of brain events as indices of mental chronometry.** B. Renault, R. Ragot, N. Lesevre, and A. Remond (CNRS, Laboratoire d'Electrophysiologie et de Neurophysiologie Appliquée, Paris, France). *Science*, vol. 215, Mar. 12, 1982, p. 1413-1415. 18 refs.

Analysis of single-trial electroencephalogram waveforms in a reaction time task demonstrated that the onset and offset values of event-related potentials can be used as indices of the duration of information processing. Two negative waves have been identified which peak at different times in different regions of the scalp, with the second overlapping the last part of the first. These waves are related in different ways to the duration of perceptual processing. (Author)

**A82-24823** **Carbon fibre reinforced epoxy prepregs and composites - Health risk aspects.** M. Kowalska (Forsvarets Forskningsanstalt, Stockholm, Sweden). *SAMPE Quarterly*, vol. 13, Jan. 1982, p. 13-19. 39 refs.

It is shown that the primary health risk problem of carbon fiber-reinforced epoxy composite production is, in all production steps, allergic contact dermatitis. The toxicity of the reactive and non-reactive diluents, accelerators, and hardeners is comparatively low, and no cancer risk has been established. In addition, the carbon fibers currently in use are of a larger diameter than would be harmful to the respiratory system. Further toxicity, dermatology and carcinogenic tests are recommended for such chemicals as DDS, TGMDA and BF3-MEA. O.C.

**A82-24830** † **Characteristics of cerebral somato-sensory evoked potentials under various conditions for the formation of simple motor reactions (Osobennosti kharakteristik somatosensornykh vyzvannykh potentsialov mozga pri raznykh usloviiakh formirovaniia prostoi dvigatel'noi reaktsii).** O. P. Tairov, A. G. Smirnov, and R. R. Islamova (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, Jan.-Feb. 1982, p. 11-17. 17 refs. In Russian.

**A82-24831** † **Systems analysis of the EEG during signal discrimination tasks (Sistemnyi analiz EEG pri zadachakh na razhichenie signalov).** J. Michel, B. Kokh, H. Cammen, I. Ellerman, Iu. N. Chegurov, and N. B. Suvorov (Berlin, Humboldt-Universität, Berlin, East Germany; Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR; Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Eksperimental'noi i Klinicheskoi Khirurgii, Tiflis, Georgian SSR). *Fiziologiia Cheloveka*, vol. 8, Jan.-Feb, 1982, p. 18-25. 16 refs. In Russian.

A dynamic systems analysis is presented of EEG patterns during graded mental work represented by a visual signal discrimination task. Experiments were performed on 18 subjects using an automated system for display projection and data recording and processing during a 20-min experimental protocol comprising five phases: rest, reference (task performance without discrimination), rest, mental work (discrimination between two types of bright ring images) and rest. Interval-amplitude analysis of the resulting EEG patterns reveals a significant enhancement in the quantity of theta waves in the vertex and simultaneous decrease in the right occipital region, and an increase in beta activity in both regions during the work phase. A significant reduction in the alpha rhythm is observed during both the reference and the work phases. Finally, in individuals with marked alpha rhythms at rest, a significant correlation is found between the appearance of a stable spindle-shaped alpha rhythm and a reduction in heart rate. A.L.W.

**A82-24832** † **Analysis of the electrographic correlates of thought activity (Analiz elektrograficheskikh korreliatov mysitel'noi deiatel'nosti).** T. A. Petrosova, V. N. Kiroi, and E. V. Mel'nikov (Rostovskii Gosudarstvennyi Universitet Rostov-on-Don, USSR). *Fiziologiia Cheloveka*, vol. 8, Jan.-Feb. 1982, p. 26-30. 16 refs. In Russian.

A correlation analysis of cerebrocortical bioelectrical activity is used to investigate the neurophysiological mechanisms of mental activity. EEGs were recorded in 15 subjects before and during the performance of various mental tasks including anagrams, arithmetic problems, logic tests and games, and analyzed by a hierarchical classification algorithm for multi-dimensional EEG time series. The analysis demonstrates changes in the level of bipotential spatial synchronization in the neocortex during mental processes, particularly a decrease in synchronization level following the presentation of instructions and during the resolution of test problems. A relative invariance of spatio-temporal synchronization in biopotentials with respect to selected electrogram parameters is also found. A.L.W.

**A82-24833** † **The dependence of the productivity of repetitious activity and tolerance to monotonous labor on the individual characteristics of the human operator (Zavisimost' produktivnosti odnoobraznoi deiatel'nosti i ustoichivosti k vozdeistviiu faktora monotonnosti truda ot individual' nykh svoistv cheloveka-operatora).** Iu. V. Bushov, Iu. A. Riabchuk, A. P. Pisanko, and A. F. Ershov (Nauchno-Issledovatel'skii Institut Biologii i Biofiziki, Tomsk, USSR). *Fiziologiia Cheloveka*, vol. 8, Jan.-Feb. 1982, p. 104-110. 19 refs. In Russian.

**A82-24834** † **Autonomous biotechnological means for the continuous monitoring and correction of physiological systems (Avtonomnye biotekhnicheskiie sredstva nepreryvnogo kontrolia i korrektsii funktsional'nykh sistem organizma).** N. N. Vasilevskii, O. V. Bogdanov, A. A. Smetankin, and N. M. Iakovlev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, Jan.-Feb. 1982, p. 111-131. 103 refs. In Russian.

The current designs, intended uses, methodological principles and typical operational results of portable autonomous devices for the long-term monitoring and correction of various physiological functions in individuals are reviewed. Devices considered include systems providing continuous telemetry or magnetic or digital recording of EKGs and other indicators of cardiovascular system condition, and the recording of EEGs during normal daily activity, which may be used for purposes of diagnosis confirmation, monitoring drug reactions and establishing the magnitudes of exercise. A variety of devices are also available which are capable of signalling the patient of his condition, either according to the results of continuous monitoring of the system in question, or continuous monitoring combined with signalling of functional variations, the signalling of dangerous conditions, or external feedback for the correction and establishment of new motor skills. A.L.W.

**A82-24835** † **The typological systematization of adaptive responses - Example of the antiorthostatic effect (O tipologicheskoi**

**sistematizatsii adaptivnykh reaktsii - Na primere antiortostaticheskogo vozdeistviia).** Sh. T. Avetikian, N. N. Vasilevskii, and A. M. Zingerman (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 132-137. 11 refs. In Russian.

An attempt is made to derive a typological classification system expressing individual differences in adaptive responses to physiological stresses as exemplified by the orthostatic effect. Physiological parameters, including heart rate, mean arterial pressure, rheoencephalograms and operator tracking errors, were measured in untrained and experienced subjects while lying in the horizontal and antiorthostatic (-45 deg) positions. Four different classes of response are distinguished on the basis of subject reactivity or areactivity, and the specificity or nonspecificity of the effective reactivity. The different classes are attributed to the interaction of the functional system in question with the nonspecific adaptive response. For the case of the antiorthostatic effect, systemic arterial pressure and heart rate may be used as indicators of nonspecific reactivity, while the dicrotic and diastolic rheoencephalogram indexes may be used to monitor the reactivity of the specific adaptation system. A.L.W.

**A82-24836** † **The regulation of body temperature during physical work (O reguliatsii temperatury tela pri fizicheskoi rabote).** S. V. Rodchenkov. *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 138-142. 12 refs. In Russian.

The relation of initial body temperature to the rise in core temperature observed during exercise is investigated in humans. Rectal, esophageal, external auditory canal and skin temperatures were measured in six healthy subjects along with oxygen demand and respiratory minute volume and rate before and during 30 and 50% maximal bicycle ergometer exercise preceded or not preceded by 1 hour of bed rest. A horizontal position is found to lead to significant reductions in esophageal temperature, oxygen demand, pulmonary ventilation and heart rate. Despite these differences in initial body temperature and physiological condition, exercise is observed to induce identical increases in esophageal temperature in subjects with lowered and normal body temperature, the increase in body temperature depending only on work intensity. Rectal temperature is found to have a longer response time than esophageal temperature, while external auditory canal responses to exercise were intermediate between those of the core and the skin. A.L.W.

**A82-24837** † **The effects of a flashing light on the spectral composition of brain biopotentials and the biomechanical effectiveness of balancing (Vliianie mel'kaiushchrego sveta na spektral'nyi sostav biopotentsialov mozga i biomekhanicheskuiu effektivnost' ravnovesiia).** E. T. Petrenko (Kazakhskii Institut Fizicheskoi Kul'tury, Alma-Ata, Kazakh SSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 143-147. 20 refs. In Russian.

The effects of light flashes of various frequencies on the spectral characteristics and coherence functions of the biopotentials of different regions of the cerebral cortex during the performance of complex equilibrium maneuvers and their biomechanical effectiveness are investigated. Experiments involved the measurement of EEGs along with microdisplacements of the center of gravity and stabillograms in elite gymnasts balancing on the toes of one foot as long as possible in the presence of light flashing at frequencies of from 3 to 25 Hz. Light flashes are observed to reduce the biomechanical effectiveness of the balancing manuever, leading to 50-60% reductions in balancing time and 30-40% increases in stabillogram amplitudes. Changes in EEG patterns corresponding to shifts in the maximum density of the frequency spectrum towards the stimulus frequency, changes in biopotential density and a reduction in their coherence at the flash frequency are also observed. A mechanism involving the disturbance of center of mass correction processes in the peripheral as well as central components of the control system is proposed to account for the effects of low-frequency light interference. A.L.W.

**A82-24838** † **The role of proprioceptive afferentation in maintaining the equilibrium of unstable mechanical systems (Uchastie propriotseptivnoi afferentatsii v podderzhanii ravnovesiia neustoichivoi mekhanicheskoi sistemy).** B. N. Smetanin, M. P. Kudinova, and V. Iu. Shlykov (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 148-154. 11 refs. In Russian.

The role of the various forms of proprioceptive sensibility in the regulation of human posture is investigated in an experimental model of the maintenance of upright posture controlled only by foot motions and subject only to proprioceptive afferentation from the feet, legs and vestibular and visual systems. Experiments were performed with an unstable mechanical system consisting of pedals to which are attached a steel bar with a weight on one side, and the subject's foot on the other, forming a single-mass structure with a center of gravity above the single axis of rotation. The temporary ischemic deafferentation of the foot by compression to stop local blood flow is found to affect the accuracy of the balancing task. Information from muscular receptors, however, is found to be more significant for the complex motions providing for the process of searching for the equilibrium zone of the system. It is proposed that this low-threshold afferentation is processed on the supraspinal level. A.L.W.

**A82-24839** # **Exploration of cardiovascular function in subjects exposed to plus Gz accelerations in a human centrifuge by new noninvasive techniques (Esplorazione della funzione cardiocircolatoria di soggetti esposti ad accelerazioni plus Gz in centrifuga umana mediante nuove tecniche incruente).** G. Rotondo (Aeronautica Militare, Servizio di Sanità, Rome, Italy), C. A. Ramacci (Scuola Militare di Sanità Aeronautica, Rome, Italy), G. Meineri (Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), G. Calcagnini, A. Ottalevi, G. Germano, A. de Zorzi, and M. Ciavarella. *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 212-229. 28 refs. In Italian.

A noninvasive technique has been developed for use in the monitoring of subject cardiovascular responses to head-foot accelerations in a human centrifuge for purposes of the selection and periodic evaluation of aerospace personnel. The technique involves the simultaneous recording of arterial pressure by a miniaturized, electronic dynamic pressurometer system and of electrocardiographic parameters, including heart rate, by the Holter method with two precordial leads. Results obtained from the monitoring of healthy subjects undergoing plus Gz acceleration at 1.5 increasing to 3.0 g are in agreement with previous observations by conventional means of arterial pressure and heart rate during acceleration, confirming the validity of the present technique. A.L.W.

**A82-24840** # **New ideas on the psychological selection of aircraft pilots (Nuove idee in tema di selezione psicologica del pilota di aereo).** A. F. Sparvieri and G. Ruggieri (Aeronautica Militare, Ufficio del Capo del Corpo Sanitario Aeronautico, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 239-249. In Italian.

A discussion is presented concerning the recent revision of psychological selection criteria for aircraft pilots. The current approach is based on probability profiles and measures of intelligence, rather than aptitude, in order to conform to recent international trends towards the discontinuation of judgements of pilot unfitness on the basis of psychological factors. Changes in regulatory procedures implied by the new criteria are also noted. A.L.W.

**A82-24841** # **Contribution to the history of the theoretical evolution of the psychological selection of aircraft pilots in Italy (Contributo alla storia dell'evoluzione dottrinaria in tema di selezione psicologica del pilota di aereo in Italia).** F. Sparvieri (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 250-280. 32 refs. In Italian.

**A82-24842** # **Old and new directions in the engineering psychology of artificial horizons and their effects on the mental hygiene of the student pilot (Vecchi e nuovi orientamenti in tema di psicotecnica costruttiva dell'orizzonte artificiale e loro riflessi sull'igiene mentale dell'allievo pilota).** F. Sparvieri (Aeronautica Militare, Servizio di Sanità, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 281-289. 10 refs. In Italian.

The development of approaches to the engineering psychology and potential psychological effects of the artificial horizon is outlined. The view of Gemelli (1942) that the use of an artificial horizon would not permit higher mental activity but would constitute only a stimulus for motor reactions is discussed and contrasted with the contemporary opinion that the use of such equipment always permits higher mental activity. A new view of the engineering psychology of the artificial horizon is then formulated in which the information provided is used for position judgment, and means by which this conception may be used to prevent neurotic reactions in the student pilot are considered. A.L.W.

**A82-24843 #** **Hematological and chromosomal analysis of a sample population working at radar installations (Analisi ematologica e cromosomica di una popolazione campione operante in centri radar).** A. Piffanelli, A. Ciaccia, P. Malacarne (Ferrara, Università, Ferrara, Italy), and P. Italiano (Organizzazione Militare Territoriale, Direzione di Sanità, Milan, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 290-304. 25 refs. In Italian.

Results are presented of a retrospective hematological and chromosomal study of a sample of workers exposed to radiofrequency radiation at a radar installation of the Italian Air Force. Levels of blood constituents, including reticulocytes, eosinophils, lymphocytes and atypical cells as well as the proportions and types of leucocyte chromosomal aberrations were measured as a function of time exposed to radar in 35 radar controllers and 15 unexposed controls. The results reveal no evidence of a statistically significant change in hematological or karyological characteristics as a result of exposure to radar. A.L.W.

**A82-24844 #** **High altitude and the oxygen dissociation curve of hemoglobin - Modifications in inter-heme cooperativity (L'alta quota e la curva di dissociazione dell'ossigeno dalla emoglobina - Modificazioni nella cooperatività tra gli emi).** P. Ascenzi (Aeronautica Militare, Servizio Sanitario, Rome, Italy) and A. M. Innocenzi (Aeronautica Militare, Servizio Sanitario, Capodichino, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 305-318. 33 refs. In Italian.

Mechanisms of adaptation to acute hypoxia are reviewed as regards experimental observations and theoretical bases of changes in oxygen transport properties. Shifts in the hemoglobin oxygen dissociation curve induced by ambient conditions within the erythrocyte are discussed with particular attention given to the allosteric effects of CO2 and 2,3-phosphoglycerate on the oxygen affinity of hemoglobin. The possible adaptive significance of a lowered oxygen affinity as indicated by a shift in dissociation curve position under conditions of acidosis, as observed most markedly in high-altitude natives, is disputed. Modifications in inter-heme cooperativity, as indicated by the shape rather than the position of the oxygenation curve, are then proposed as the physiological basis of changes in oxygen transport properties upon exposure to high altitudes. A.L.W.

**A82-24845 #** **Measurements of tinnitus in transmission and perceptive deafness (Rilievi acufenometrici nelle sordità di trasmissione e di percezione).** S. Bucci, A. di Carlo, M. Saponara, L. Zangrilli, and V. Camarda (Roma, Università; Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 319-331. 11 refs. In Italian.

The possible relation between the characteristics of tinnitus and the type of auricular lesion inducing it is investigated. Automatic tinnitometry was used to measure the tone, intensity and harmonic composition of tinnitus accompanying cochlear perceptive deafness, post-cochlear perceptive deafness and transmission deafness. Although no correlation is found between tinnitus characteristics and the site of conductive deafness, spectral properties of the tinnitus in perceptive deafness are found to be closely related to the frequency of the auditory lesion, and distinct from those found in other forms of deafness. A.L.W.

**A82-24846 #** **Man in weightlessness - Physiological problems, clinical aspects, prevention and protection.** H. S. Fuchs. *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 332-346.

Disturbances in human physiology induced by the weightless state in space are discussed, and research on the prevention of the detrimental effects of weightlessness is reviewed. Attention is given to anthropometric changes including loss of body mass, increase in height, and fluid volume shifts, cardiovascular responses, bone demineralization, changes in renal, electrolyte and endocrine functions, decreases in red cell mass, and central nervous system responses affecting sleep patterns, space motion sickness, and the perception of high energy heavy cosmic ray particles. Current research has thus centered on the areas of space motion sickness, cardiovascular deconditioning, bone mineral and muscle losses, red blood cell production and fluid and electrolyte changes. Opportunities for the further study of the physiological effects of weightlessness that will be provided by future Spacelab missions are also noted. A.L.W.

**A82-24847 #** **Factor calculation of the test variables in use by the legal medicine institutes of the Italian Air Force (Calculo fattoriale sulle variabili testologiche in uso presso gli istituti medico legali A.M.).** F. Sparvieri and B. de Rosa (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 386-391. In Italian.

A factor analysis of variables measured by the Italian Air Force is presented in order to demonstrate the degree of saturation of the Spearman G factor in Air Force testing. The variables considered are the D48, PM38, reaction time and its variability, tachistoscope data, tremometry, and numbers and duration of errors in a muscular coordination test. The low G levels obtained for all variables including D48 and PM38 suggest that G values be determined not from the reasoning tests only, but from the results of all the tests according to a multiple regression model in the prediction of future professional performance. A.L.W.

**A82-24901** **Psychophysical studies of perception and memory (Psikhofizicheskie issledovaniia vospriiatiia i pamiati).** Edited by Iu. M. Zabrodin. Moscow, Izdatel'stvo Nauka, 1981. 216 p. In Russian.

Topics discussed include mathematical models of detection and discrimination in psychophysics, scales of subjective intensity and judgement processes, and a dynamic approach to the analysis of the signal detection process in psychophysics. Also considered are selective visual adaptation, the application of the evoked potential method to psychophysical studies, an experimental study of auditory perception, the stability of a nonthreshold index of sensitivity, and the use of neurophysiological methods to determine operator speed. B.J.

**A82-24902 †** **Problems of the psychic reflection of the properties of the objective world on the sensory-perception level (Problemy psikhicheskogo otrazheniia svoistv ob'ektivnogo mira na sensorno-pertseptivnom urovne).** K. V. Bardin and Iu. M. Zabrodin. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 9-42. 57 refs. In Russian.

A review of the historical development and foundations of psychophysics is presented. Consideration is then given to two basic problems of psychophysics: the discreteness-continuity problem of sensory series, and the problem of the fundamental law of psychophysics (i.e., the Weber-Fechner law). B.J.

**A82-24903 †** **Mathematical models of detection and discrimination (Matematicheskie modeli obnoruzheniie i razlicheniia).** P. Kvaas. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 43-60. 20 refs. In Russian.

A review of mathematical models of detection and discrimination in psychophysics is presented. The detection models considered include the classic threshold model, the Tanner-Swets decision-making model of detection, and Luce's low-threshold detection model. Among the discrimination models considered are Thurstone's model based on the law of comparative judgment, and the theory of the neural quantum. Results of the models are compared with experimental data, and an assessment of the various models is presented. B.J.

**A82-24904 †** **Scales of subjective intensities and judgment processes (Shkaly sub'ektivnykh intensivnostei i protsessy suzhdeniia).** P. Pettsol'd. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 61-69. 7 refs. In Russian.

The paper examines a fundamental problem of psychophysics: the determination of the relationship between the intensity of the stimulus and its subjective impression. Attention is given to such aspects of the problem as the modality-dependence of the exponent in Steven's law, the intramodal dependence of the exponent on the stimulus range, the effect of an aggregate of stimuli, and information integration. As an example, the judgment process as a whole is considered, and sensory transformation is examined as a constituent part of this process. It is found that, within the limits of numerical evaluations, the power law describes well the dependence of subjective intensity on physical intensity. It is noted that various methods lead to various information-processing results, which can be determined by specific laws; and the most important thing is to determine the invariant quantities and the specifying components. B.J.

**A82-24906 † Dynamic approach to the analysis of the signal detection process (Dinamicheskii podkhod k analizu struktury protsessa obnaryzheniia signala).** E. Z. Frishman. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 69-76. 27 refs. In Russian.

The paper examines a dynamic approach in psychophysics, wherein the threshold is taken as the index of subjective activity in the signal detection process. It is found that a lowering of the threshold is determined by an increase in sensory capability and a decrease in the rigor of the detection criterion, whereas a raising of the threshold is associated with the opposite effect: a decrease in sensory capability and an increase in the rigor of the criterion. Particular attention is given to problems of threshold variance. B.J.

**A82-24906 † Selective visual adaptation and the feature model (Selektivnaia zritel'naia adaptatsiia i model' priznaka).** E. N. Dzhafarov and Iu. K. Allik. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 77-92. 36 refs. In Russian.

Problems of visual adaptation are discussed, using as an illustration Blakemore and Campbell's (1969) study on the existence of neurons in the human visual system selectively sensitive to the orientation and size of retinal images. Three types of models for the analysis of adaptation experiments are considered: the realization of reference stimulus-scale value pairs, the adaptation model, and the feature model. Particular consideration is given to figural aftereffects. B.J.

**A82-24907 † Objective sensometrics on the basis of the alpha-rhythm block reaction (Ob'ektivnaia sensometriia po reaktsii blokady al'fa-ritma).** M. B. Mikhalevskaia. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 92-117. 65 refs. In Russian.

The possibility of developing an objective sensometrics on the basis of the alpha-rhythm block (ARB) reaction is examined theoretically and experimentally. The general characteristics of the ARB as an index of sensitivity are considered, with attention given to the functional significance of the ARB and the parameters of an ARB reaction induced by an optical stimulus. An experiment dealing with the minimization of the ARB in background EEG is discussed. Attention is also given to the application of the ARB reaction in psychophysical studies; objective sensometrics of the auditory function is considered as an example. B.J.

**A82-24908 † Experience with the application of the method of evoked potentials in psychophysical studies (Opyt primeneniia metoda vyzvonnykh potentsialov v psikhofizicheskom issledovanii).** L. V. Matveeva. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 118-139. 41 refs. In Russian.

A psychophysical experiment is described in which the amplitude characteristics of evoked potentials were correlated with psychophysical indices of detection. An attempt is made to verify the hypothesis that early evoked-potential waves reflect the magnitude of the physical stimulus. It is found that the early waves do indeed reflect the magnitude of the stimulus, but that this reflection is not direct (as was originally thought) but indirect: *i.e.*, it is manifested in the sensory effect. Therefore it is more correct to say that the state of the analyzer input (and not the magnitude of the stimulus) is reflected in the early components. B.J.

**A82-24909 † Analysis of operator speed by means of neurophysiological methods (Analiz skorosti deistvii operatora s pomoshch'iu neirofiziologicheskikh metodov).** B. G. Bovin. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 206-214. 9 refs. In Russian.

A formula for determining the reaction time of human operators is developed and confirmed experimentally. A direct comparison of the value of the dominant alpha-rhythm and the reaction time for various signal alphabet lengths yields a negative correlation coefficient: i.e., the greater the alpha-rhythm frequency, the shorter the reaction time. The results agree with Lebedev and Lutskii's reaction model and indicate that neurophysiological (*i.e.*, EEG) methods can be used to study operator reaction time. B.J.

**A82-24910 Tissue hypoxia and its correction (Tkanevaia gipoksiia i ee korrektsiia).** Edited by L. L. Vannikov. Novosibirsk, Izdatel'stvo Nauka, 1981. 80 p. In Russian.

The book treats the mechanisms giving rise to tissue hypoxia and possible means of chemical intervention for the treatment of tissue hypoxia arising in a variety of pathological conditions. The antioxidant effects of sodium persulfate in the treatment of radiation-induced tissue hypoxia are demonstrated, and mechanisms of early post-ischemic disturbances giving rise to hypoxia are examined together with the effects of sodium persulfate and cytochrome c on their development. Tissue oxygen balance in diabetes mellitus is discussed, and the treatment of diabetes with rheopolyglucine, heparin and sodium persulfate is investigated. Effects of vibration sickness on blood oxygen balance and acid-base equilibrium and of radiation on intracellular membranes and tissue hypoxia are also considered, and the oxidative properties of persulfates are discussed. A.L.W.

**A82-24912 Regulation of Pa/CO2/ and ventilation in humans inspiring low levels of CO2.** H. V. Forster, J. P. Klein, L. H. Hamilton, and J. P. Kampine (Wisconsin, Medical College, Milwaukee; U.S. Veterans Administration Medical Center, Wood, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 287-294. 35 refs. Research supported by the U.S. Veterans Administration.

**A82-24913 Free and conjugated catecholamines and metabolites in cat urine after hypoxia.** J. Claustre and L. Peyrin (Lyon I, Université, Lyons, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 304-308. 32 refs. Research supported by the Université Lyon I; Centre National de la Recherche Scientifique Contract No. ER-196.

**A82-24914 Renin, aldosterone, and converting enzyme during exercise and acute hypoxia in humans.** J. S. Milledge and D. M. Catley (Northwick Park Hospital, Harrow, Middx., England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 320-323. 14 refs.

The possibility that hypoxia might inhibit the secretion of angiotensin-converting enzyme (ACE) would explain the low concentrations of aldosterone reported in humans at high altitude. To observe the effect of such a reduction in ACE concentration on the plasma aldosterone concentration (PAC), four subjects performed mild exercise throughout a 2-h study so as to elevate their plasma renin activity (PRA). After the first 60 min breathing air they were switched to breathing 12.8% O2 (4,000 m altitude equivalent). Venous samples were taken at intervals for hormone analysis. Results showed the expected rise of PRA and PAC both tending toward a plateau after about 45 min. There was no significant change in ACE activity. Hypoxia produced a further 50% rise in PRA but a fall in PAC and a 30% reduction in ACE activity. Angiotensin I concentrations closely followed PRA throughout. These results indicate that during exercise acute hypoxia changes the usual close relationship between PAC and PRA by reducing ACE activity. (Author)

**A82-24915 Mechanical cardiopulmonary interdependence.** T. C. Lloyd, Jr. (Indiana University Medical Center, Indianapolis, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 333-339. 15 refs. Grant No. PHS-R01-HL-15694.

Cardiopulmonary interdependence in ten pentobarbital sodium-anesthetized dogs is investigated in three ways. In the first, the increase in left atrial pressure required to hold cardiac output constant on application of a positive end-expiratory pressure is measured. In the second, the reduction in left atrial pressure required to mimic the cardiac output fall observed when a positive end-expiratory pressure is applied while the left atrial pressure is held constant is determined. In the third, left ventricular pressure-volume curves measured in freshly dead dogs during ventilation are compared with and without a positive end-expiratory pressure. It is found that the atrial pressure changes can be divided into terms for pleural pressure change, lung deformation, and an undefined residual component and that they can be used to obtain a compliance opposing ventricular filling. Another compliance is derived from the pressure-volume curves. C.R.

**A82-24916 Heart contractility at pressure loads induced by ischemia of exercised muscle in humans.** F. Bonde-Petersen and Y. Suzuki (Copenhagen, University, Copenhagen, Denmark). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 340-345. 19 refs. Research supported by the Danish Space Research Council.

**A82-24917 Pulmonary carbonic anhydrase in the human, monkey, and rat.** G. Lönnerholm (Uppsala, Universitet, Uppsala, Sweden). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 352-356. 30 refs. Research supported by the Swedish Medical Research Council Grants No. 5413; No. 2874.

**A82-24918 Bradykinin-induced increase in pulmonary vascular permeability in hypoxic sheep.** L. M. Pang, H. M. O'Brodovich, R. B. Mellins, and S. A. Stalcup (Columbia University, New York, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 370-375. 30 refs. Research supported by the New York Heart Association; Grants No. NIH-HL-14214; No. NIH-HL-07421.

**A82-24919 Ventilatory responses at rest and during exercise in marathon runners.** D. A. Mahler, E. D. Moritz, and J. Loke (Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 388-392. 30 refs.

To evaluate ventilatory control and its possible role in athletic performance, measurements are made of ventilatory responses to hypercapnia and hypoxia at rest and of ventilatory equivalents for carbon dioxide and oxygen during exercise in 20 marathon runners and 20 control subjects. No significant differences exist in the ventilatory responses at rest to hypercapnia and hypoxia. In similar fashion, no significant differences are found in the ventilatory equivalents for carbon dioxide and oxygen between the two groups. Good correlation is observed between hypercapnic response at rest and exercise ventilation in the runners. However, both hypercapnic and hypoxic ventilatory responses correlate poorly with marathon running time. The results demonstrate no differences in ventilatory responses at rest and during exercise between marathon runners and control subjects. C.R.

**A82-24920 Strain difference in thermoregulation of rats surviving extreme heat.** F. Furuyama (Nagoya City University, Nagoya, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 410-415. 30 refs.

**A82-24921 Effect of muscle glycogen content on glucose uptake following exercise.** R. D. Fell, S. E. Terblanche, J. L. Ivy, J. C. Young, and J. O. Holloszy (Washington University, St. Louis, MO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 434-437. 24 refs. Grants No. NIH-AM-18986; No. NIH-AG-00425.

This study examined the effects of raising muscle glycogen by carbohydrate feeding and of keeping muscle glycogen low by carbohydrate restriction following exhausting exercise on the ability of perfused skeletal muscle to take up glucose and to synthesize glycogen. Muscle glycogen concentration was more than twice as high in the rats fed carbohydrate as in those not given carbohydrate. Muscle glycogen synthesis during a 30-min perfusion with glucose and insulin was significantly greater in the animals with low muscle glycogen. Furthermore the muscles with low glycogen content converted a greater proportion of the glucose taken up to glycogen and less to lactate than did the muscles with high glycogen content. In rats subjected to exhausting exercise on the preceding day, the rate of glucose uptake by perfused skeletal muscle was significantly higher (60-80%) at the same insulin concentration in animals in which muscle glycogen was kept low than in those in which glycogen was raised by carbohydrate feeding. (Author)

**A82-24922 Guinea pig soleus and gastrocnemius electromyograms at varying speeds, grades, and loads.** K. R. Gardiner, P. F. Gardiner, and V. R. Edgerton (California, University, Los Angeles, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 451-457. 21 refs.

**A82-24923 Isotopic analysis of leucine and urea metabolism in exercising humans.** R. R. Wolfe, R. D. Goodenough, M. H. Wolfe, G. T. Royle, and E. R. Nadel (John B. Pierce Foundation, New Haven, CT; Harvard University; Massachusetts General Hospital; Shriners Burns Institute, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 458-466. 20 refs. Grants No. NIH-GM-00455-03; No. NIH-GM-21700-07; No. NIH-GM-007-035.

**A82-25134 Relation between high density lipoprotein cholesterol and coronary artery disease in asymptomatic men.** G. S. Uhl, R. G. Troxler, J. R. Hickman, Jr., and D. Clark (USAF, School of Aerospace Medicine, Brooks AFB, TX). *American Journal of Cardiology*, vol. 48, Nov. 1981, p. 903-910. 25 refs.

Recent epidemiologic investigations have shown high density lipoprotein (HDL) cholesterol levels to have an inverse relation to the risk of developing coronary heart disease. The present paper reports a study of the relation of HDL cholesterol levels to latent coronary heart disease in asymptomatic subjects. Determinations of total serum cholesterol, HDL cholesterol, and triglycerides were made concurrently with electrocardiographic studies including symptom-limited exercise tolerance testing in 572 consecutive aircrew members. In addition, cardiac catheterization was performed on the 132 patients showing abnormal exercise electrocardiograms. The remaining 440 men, believed to have a 1% chance of having coronary artery disease, exhibited a mean cholesterol level of 213 mg/100 ml, mean HDL cholesterol of 51 mg/100 ml and mean cholesterol/HDL ratio of 4.4. Mean values did not differ significantly in men with normal angiographic findings or subcritical coronary disease, however 14 of 16 men with coronary artery disease had a cholesterol/HDL ratio of 6.0 or more compared with only four with normal coronary arteries. Results suggest that HDL cholesterol levels may be used to identify asymptomatic persons with greater risks of coronary heart disease. A.L.W.

**A82-25135 Limitations of echocardiographic techniques in evaluation of left atrial masses.** P. C. Come, M. F. Riley, J. F. Markis, and M. Malagold (Beth Israel Hospital; Harvard University, Boston, MA). *American Journal of Cardiology*, vol. 48, Nov. 1981, p. 947-953. 36 refs.

Limitations in the use of M mode and two-dimensional echocardiography in the evaluation of left atrial masses are demonstrated in case histories of patients in whom echocardiography failed to detect or greatly underestimated the extent of the lesion. M mode echocardiography in four patients and two-dimensional echocardiography in three of the four revealed the left atrium to be clear of echoes in two patients subsequently found in pathologic examination to have left atrial thrombi weighing 35 and 100 g. Definitely abnormal echoes were visualized only in the inferior aspect of the left atrium beneath the posterior root of the aorta in the third patient for whom angiography revealed a 70 g myxoma filling almost the entire left atrium. In the fourth patient, two-dimensional four-chamber apical scanning was superior to two-dimensional and M-mode long-axis scanning in defining the extent of a large left atrial myxoma. The results may be explained by the relatively homogeneous nature of certain intracavity masses. A.L.W.

**A82-25136 Two dimensional echocardiographic detection of intraatrial masses.** N. L. DePace, R. L. Soulen, M. N. Kotler, and G. S. Mintz (Hahnemann Medical College and Hospital; Temple University Hospital, Philadelphia, PA). *American Journal of Cardiology*, vol. 48, Nov. 1981, p. 954-960. 46 refs.

The relative merits of two-dimensional and M mode echocardiography in the evaluation of intraatrial masses are investigated in a study of 19 patients. In ten patients with rheumatic mitral stenosis, two-dimensional echocardiography revealed left atrial thrombus as indicated by a mass of irregular nonmobile laminated echoes within an enlarged atrial cavity, usually with a broad base of attachment to the posterior left atrial wall. In seven patients with a left atrial myxoma, the myxoma appeared as a mottled ovoid, sharply demarcated mobile mass attached to the interatrial septum. Two-dimensional echocardiography also detected the presence of a right atrial angiosarcoma and a left atrial leiomyosarcoma in the remaining patients. M mode echocardiography, on the other hand, was able to detect only six of the myxomas, one thrombus, and neither of the other tumors. Two dimensional echocardiography thus appears to be the technique of choice in the detection, localization and differentiation of intraatrial masses. A.L.W.

**A82-25162** **Detection and recognition - Concurrent processes in perception.** R. Parasuraman, F. Richer, and J. Beatty (California, University, Los Angeles, CA). *Perception and Psychophysics*, vol. 31, no. 1, Jan. 1982, p. 1-12. 45 refs. Contract No. N00014-76-C-0616.

The relationships between and dynamic brain characteristics of detection and recognition are investigated by the examination of the event-related potentials (ERPs) of the brain during a simultaneous detection and recognition task. EEGs were recorded in 10 subjects listening to pure tones in noise who were asked to report whether one of a set of a target tones had occurred, and to which of two or four tones the target corresponded. A correctly detected and identified target stimulus is found to be associated with changes in the N100 negative potential and in the P300 positive brain potential that disclose temporal features of stimulus processing. In addition, a slow positive potential is observed to contribute to changes in the P300 amplitude. The amplitude of the N100 ERP component varies only with processing related to stimulus detection, while the P300 component varies with both detection and recognition and the slow potential varies only with recognition. Results support the view that detection and recognition are partially independent, concurrent processes, with the process of detection beginning before the process of identification. A.L.W.

**A82-25188** † **Current questions in the problem of flight crew fatigue (Ob aktual'nykh voprosakh problemy utomleniia letnogo sostava).** V. I. Kopanev. *Voenno-Meditsinskii Zhurnal*, Jan. 1982, p. 49-51. In Russian.

Various aspects of the problem of flight fatigue requiring further study are discussed. A definition for flight fatigue is proposed as the physiological state arising in air crews during flight as the result of flight activity and characterized by a reduction in work capacity and changes in homeostasis parameters. The evaluation of crew member work capacity based on criteria of professional activity and physiological condition is considered, and the differentiation between states of flight fatigue and overstrain is discussed. The signs of flight fatigue are examined, with attention given to the reduction in work capacity, behavioral reactions, slowing of mental processes, illusions and loss of spatial orientation, the appearance of the stress state, subjective feelings of fatigue, and changes in hemodynamics, and possible means for preventing fatigue and overstrain are considered. A.L.W.

**A82-25189** † **Characteristics of skin function in sailors in the tropics (Nekotorye osobennosti funktsii kozhi u moriakov v tropikakh).** G. F. Grigorenko and V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal*, Jan. 1982, p. 52-54. In Russian.

Results are presented of an investigation of the functional characteristics of the skin and their relation to skin pathology in sailors in the tropics. Parameters characterizing skin thermoregulatory, protective, excretory and reabsorptive function were measured before and after sailing in sailors completing cruises of various durations in subtropical and tropical waters. Measurements of skin temperatures, sweat production rates and sensitivity to parasympathetic mediators reveal an enhancement in thermoregulatory functioning, while analyses of sweat composition at various stages indicate enhancements in excretory and reabsorptive functions. Changes in responses to the Kavetskii and Rotter tests, vascular resistance, ultraviolet biodose times, acid-base balance and bactericidal properties also reveal significant changes in the protective functions of the skin. In sailors with various skin diseases (dermatitis, eczema, pyodermitis), significant differences in protective, reabsorptive, excretory functions were found with respect to healthy sailors. Results suggest a connection between characteristics of skin function in hot and humid climates and the increased dermal morbidity of sailors in the tropics, and allow a set of recommendations to be formulated for the prevention of skin diseases. A.L.W.

**A82-25220** **Biochemical evolution.** Edited by H. Gutfreund (Bristol, University, Bristol, England). Cambridge and New York, Cambridge University Press, 1981. 374 p. $25.

Selected topics in the evolution of biochemical pathways and the use of biochemical techniques to derive phylogenetic relationships are discussed. Prebiotic chemical evolution is considered, particularly as regards self-replication, translation and compartmentalization, and data handling methods for deriving phylogenetic trees from amino acid or nucleotide sequences are examined. Attention is also given to the evolution of bacterial enzymes, the photosynthetic apparatus in procaryotes and in eucaryotes as a result of endosymbiosis, the major histo-compatibility antigens, immunoglobulins, the control mechanisms of muscle contraction, and the vertebrate visual pigments. A.L.W.

**A82-25230** † **The controlled cultivation of plants in an artificial medium - Biotechnological foundations (Upravliaemoe kul'tivirovanie rastenii v iskusstvennoi srede - Biotekhnicheskie osnovy).** V. I. Rozhdestvenskii and A. F. Kleshnin. Moscow, Izdatel'stvo Nauka, 1980. 200 p. 210 refs. In Russian.

Technological aspects of the cultivation of plants under automatically controlled artificial conditions are discussed in light of the importance of such techniques for the optimization of biomass and agricultural production. A survey is presented of the various types and organization of phytotrons and other systems for the controlled cultivation of plants in artificial media. Particular attention is then given to the components of such systems, including high-intensity irradiators, air conditioning systems, systems for the automatic regulation of the gas medium and the measurement of photosynthesis intensity, and the automatic control of plant mineral requirements. Potentials for the inclusion of electronic computer control are also considered. A.L.W.

**A82-25231** † **Systemic mechanisms of emotional stress (Sistemnye mekhanizmy emotsional'nogo stressa).** K. V. Sudakov. Moscow, Izdatel'stvo Meditsina, 1981. 232 p. 145 refs. In Russian.

The book examines the systemic manifestations of emotional stress occurring in humans and animals in conflict situations. Emotional stress is discussed as the leading factor in the development of cerebrovisceral disorders, and systemic mechanisms of arterial pressure regulation and their impairment under conditions of emotional stress are considered. Attention is given to genetic, nervous and humoral mechanisms of resistance and predisposition of the cardiovascular system to emotional stress, and to the cerebral mechanisms of the development of the stress syndrome. Recommendations are also presented concerning means of increasing human cardiovascular resistance to acute and chronic emotional stresses. A.L.W.

**A82-25244** † **Innervation of skin glands of the hedgehog /Erinaceus europaeus/ and its histochemical changes induced by hibernation (Innervatsiia kozhnykh zhelez ezha /Erinaceus europaeus/ i ee gistokhimicheskie izmeneniia, vyzyvaemye zimnei spiachkoi).** V. E. Sokolov, S. A. Shabadash, and T. I. Zelikina (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 252, no. 4, 1982, p. 978-981. 15 refs. In Russian.

**A82-25321** † **Investigation of the effects of space flight factors on rat bone marrow cell chromosomes (Issledovanie vliianiia faktorov kosmicheskogo poleta na khromosomy kletok kostnogo mozga krys).** N. N. Bobkova. *Kosmicheskie Issledovaniia*, vol. 20, Jan.-Feb. 1982, p. 154, 155. 11 refs. In Russian.

Metaphase analyses of the structure of bone marrow cell chromosomes were performed in rats on the second and 27th days following 22-day exposure on board the Cosmos-605 satellite.

Frequencies of chromosome aberrations (individual fragments) are observed to range between 1 and 4% in experimental animals, and between 1 and 3% in ground controls. Statistical analysis reveals the experimental aberration frequencies not to differ significantly from the control, and to fall within the limits of the oscillations of the spontaneous rate. A.L.W.

**A82-25372 * Carbon isotopic fractionation in the biosynthesis of bacterial fatty acids - Ozonolysis of unsaturated fatty acids as a means of determining the intramolecular distribution of carbon isotopes.** K. D. Monson and J. M. Hayes (Indiana University, Bloomington, IN). *Geochimica et Cosmochimica Acta*, vol. 46, Feb. 1982, p. 139-149. 45 refs. Grant No. NGR-15-003-118.

**A82-25494 Method for the analysis of pilot postural behavior based on head-up - head-down simulations (Méthode d'analyse du comportement postural du pilote à partir de simulations tête haute - tête basse).** A. Coblentz, R. Mollard, G. Ignazi, R. Steck (Paris V, Université, Paris, France), G. Santucci, J.-P. Menu, and D. Batejat (Centre d'Etude et de Recherche de Médecine Aérospatiale, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 184-190. 7 refs. In French.

A simulation method has been developed for use in the analysis of pilot posture during a mission, allowing the definition of zones of preferential pilot activity for purposes of cockpit design. The method is based on experiments undertaken with an adjustable cockpit model, using a task simulation software package reproducing tasks performed in the head-up and head-down positions. Postural variations are studied by means of numerical image processing, allowing the three-dimensional analysis of segmental displacements. The method is to be applied in experiments with a sample of pilots selected to exhibit the biometric characteristics of the predicted pilot population 10-15 years in the future, and the resulting experimental data will be used in the modeling of the cockpit-pilot system. A.L.W.

**A82-25495 Modifications in systolic time intervals induced by the transition to weightlessness (Modifications des temps systoliques provoquées par le passage en absence de pesanteur).** J. Colin (Service de Santé des Armées, Centre de Recherches, Clamart, Hauts-de-Seine, France) and J. Timbal. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 191-194. 11 refs. In French.

Cardiovascular effects of the transition from normal gravity to weightlessness are investigated in a noninvasive study of systolic time intervals in subjects undergoing a body tilt from the passive vertical position to the quasi-horizontal. Systolic intervals were measured by cardiac electrical impedance plethysmography during rest in the vertical position and tilting to a head-down position at an angle of -5 deg from the horizontal. While no variation is observed in the presystole and the time separating the Q wave and mitral closure, tilting is found to induce significant decreases in heart rate, pre-ejection period, isovolumetric contraction time and pre-ejection period/left ventricular ejection time ratio, and increases in left ventricular ejection time. Results are symmetric with respect to experiments on tilting from the horizontal to the vertical positions, and may be explained as the result of hemodynamic reactions to fluid shifts. A.L.W.

**A82-25496 Coronary risk in flight personnel: Epidemiologic approach - Incidence upon screening and prevention (Le risque coronarien dans le personnel navigant: Approche épidémiologique - Incidence sur le dépistage et la prévention).** G. Leguay, J. F. Poulignier, A. Seigneuric, G. Jacob, and J. Traversat (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 195-200. 9 refs. In French.

An epidemiologic study is presented of the risk factors for the development of coronary artery disease in flight personnel and their implications for screening and prevention. The longitudinal study was performed using the medical records of 100 military flight personnel, 25 of whom had a history of myocardial infarction, 25 of whom had experienced primary repolarization difficulties classified as benign, and the remainder of whom had no evident coronary problems. Analysis of the risk factors previously uncovered in the Framingham study (cholesterol, arterial pressure, smoking, diabetes, obesity, a family history of cardiovascular problems, psychological profile and age) reveals them not to be influenced by aeronautical activity. It is, however, observed that transport pilots have a greater risk of developing myocardial infarction than fighter pilots. The importance of reducing the known risk factors for the prevention of coronary disease is emphasized, and the greater predictive value of stress electrocardiograms in the identification of disease in individuals at high epidemiologic risk is noted. A.L.W.

**A82-25497 Mechanisms of motion sickness (Mécanismes du mal des transports).** A. Léger (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 201-204. 8 refs. In French.

Recent hypotheses proposed to explain the essential nature of motion sickness are discussed. Following a survey of the nervous and sensory structures implicated in the etiology of motion sickness, including most importantly components of the vestibular system, attention is given to the sensory mismatch model developed by Reason (1975, 1978). The model mechanism is based upon the comparison of sets of sensory inputs with an internal model, resulting in an error signal inducing the motion sickness when inputs do not agree with past experience. Conflicts are classified as visual-vestibular or intralabyrinthine, and may arise upon the simultaneous presentation of stimuli, or the absence of one set of stimuli. The significance of motion sickness is also considered, and it is noted that it may be useful to treat the syndrome as a stress response. A.L.W.

**A82-25498 The psychological selection of French astronauts for a Franco-Soviet scientific space mission (La sélection psychologique des spationautes Français en vue d'une mission scientifique spatiale Franco-Soviétique).** J. Bremond and G. Veron (Service de Santé des l'Armées, Saint-Cyr-l'Ecole, Yvelines, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 205-210. In French.

The procedures used in the psychological selection of French candidates in a joint Franco-Soviet mission to the Soyuz space station are discussed. The psychological selection process, performed within the context of a full educational, professional medical, psychological and training selection program, includes a series of performance tests to measure numerical, spatial, verbal and social abilities, memory and intelligence, personality tests to detect psychopathological tendencies, group interaction tests to study decision making, intellectual rigor and honesty and social participation, and conversations with psychiatrists. Out of the 193 candidates undergoing the entire evaluation process, two were finally selected to undergo training in the USSR, both being military pilots and engineers pursuing careers as test pilots. A.L.W.

**A82-25500 Cosmic ray measurements on board the Concorde /results after four years/ (Mesures des radiations cosmiques à bord de Concorde /résultats après 4 ans d'exploitation/).** J. Pasquet, J. Lavernhe, and E. Lafontaine (Compagnie Nationale Air France, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 222-227. 15 refs. In French.

The advent of commercial supersonic flight has introduced the flying population to a new potential risk - increased cosmic radiation at stratospheric heights. The present paper presents the results of four years of measurement of the radiation doses received on board the Concorde. Dose rates are observed to be greater over the North American routes than the other routes served, in agreement with expectations, and average 1.40 and 0.80 mrem hour, respectively. The alert level of 10 mrem/h was never encountered, nor were solar proton events observed. The values obtained are well below international radiation standards for occupational and public exposures to ionizing radiation, and appear low with respect to doses required for significant carcinogenic effects. It is noted that, although reassuring, the results do not justify the discontinuation of radiation monitoring or the modification of radiation alert or protection procedures. A.L.W.

# STAR ENTRIES

**N82-18255*#** Mainz Univ. (West Germany).
**EFFECTS OF RECTILINEAR ACCELERATION, OPTOKINETIC AND CALORIC STIMULI IN SPACE**
R. vonBaumgarten *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 5 p

Avail: NTIS HC A08/MF A01 CSCL 06P

The set of experiments comprising the Spacelab 1ES201 package designed to investigate the human vestibular system and equilibratory function in weightlessness are described. The specific objectives of the experiments include: (1) the determination of the threshold of perception of linear oscillatory motion; (2) measurement of physiological and subjective responses to supra threshold, linear and angular motion stimuli; (3) study of the postural adjustments, eye movements, and illusions of attitude and motion evoked by optokinetic stimuli, (i.e., moving visual patterns) in order to assess visual/vestibular interactions; (4) examination of the effect of thermal stimulations of the vestibular apparatus to determine if the eye movements elicited by the 'caloric test' are used by a density gradient in the semicircular canal; and (5) investigation of the pathogenesis of space motion sickness by recording signs and symptoms during the course of vestibular stimulation and, specifically, when the test subject is exposed to sustained, linear ocillatory motion. M.G.

**N82-18256*#** Massachusetts Inst. of Tech., Cambridge.
**VESTIBULAR EXPERIMENTS**
L. R. Young *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 5 p

Avail: NTIS HC A08/MF A01 CSCL 06P

Spacelab experiments designed to investigate space motion sickness, any associated changes in otolith-mediated responses occurring during weightlessness, and the carryover of any such changes to postflight conditions are described. The experiments aimed at assessing otolithic responses in space are intended to clarify presumed alterations in vestibular function during weightlessness. Vestibular function will be investigated at several levels: vestibulo-ocular reflexes, vestibulo-spinal pathways, cortical functions involving perception of motion and spatial orientation, visual vestibular interaction, and motion sickness susceptibility. A second major objective relates to space motion sickness and man's well-being and productivity in space. M.G.

**N82-18257*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**VESTIBULO-SPINAL REFLEX MECHANISMS**
M. F. Reschke *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06P

The specific objectives of experiments designed to investigate postural reflex behavior during sustained weightlessness are discussed. The first is to investigate, during prolonged weightlessness with Hoffmann response (H-reflex) measurement procedures, vestibulo-spinal reflexes associated with vestibular (otolith) responses evoked during an applied linear acceleration. This objective includes not only an evaluation of otolith-induced changes in a major postural muscle but also an investigation with this technique of the adaptive process of the vestibular system and spinal reflex mechanisms to this unique environment. The second objective is to relate space motion sickness to the results of this investigation. Finally, a return to the vestibulo-spinal and postural reflexes to normal values following the flight will be examined. The flight experiment involves activation of nerve tissue (tibial N) with electrical shock and the recording of resulting muscle activity (soleus) with surface electrodes. Soleus/spinal H-reflex testing procedures will be used in conjuction with linear acceleration through the subject's X-axis. M.G.

**N82-18258*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**THE INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN**
Carolyn S. Leach *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06S

An experiment is described the purpose of which is to measure specific factors relative to the control of erythrokinetics in man which might be altered during the first seven days of exposure to the weightless environment of space flight. It is anticipated that these data will provide information relative to the mechanism by which the red cell mass is reduced during space flight. Specifically, the experiment is designed to establish: (1) if there is a significant change in red cell mass and plasma volume during the initial period of exposure to weightlessness; (2) if the plasma concentration of erythropoietin is reduced; (3) if there is an increase in the plasma concentration of erythropoietin inhibitors; (4) if there is a change in the effectiveness of erythropoiesis; and (5) if the number and age distribution of reticulocytes are altered. M.G.

**N82-18259*#** Freie Univ., Berlin (West Germany). Physiologisches Inst.
**MEASUREMENT OF CENTRAL VENOUS PRESSURE AND DETERMINATION OF HORMONES IN BLOOD SERUM DURING WEIGHTLESSNESS**
K. Kirsch *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06P

A Spacelab experiment is described which proposes to obtain data on the degree of engorgement of the cephalad circulation during weightlessness by recording central venous pressure. Of practical importance is the question of how close the astronauts are to pulmonary edema and whether the pressure falls toward normal during the time of the mission. Another experiment to investigate deviations from normal fluid and mineral metabolism, possibly initiated by the central engorgement of the low pressure system, is discussed. Hormones responsible for the control of water and mineral balance (vasopressin, catecholamines, renin, aldosterone, corticosteroids, and prostaglandin E1) will be analyzed from blood samples. M.G.

**N82-18260*#** Illinois Univ., Urbana.
**EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE OF HUMANS**
E. W. Voss, Jr. *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06S

An experiment to examine the possible interrelationship of various classes of immunoglobulins by utilizing the effect of weightlessness as a stress factor and subsequently measuring inhibitory, compensatory, or enhancing interrelationchips. A second objective of the experiment is to investigate the state of immune competency under conditions of sustained weightlessness. M.G.

**N82-18261*#** Eidgenoessische Technische Hochschule, Zurich (Switzerland).
**EFFECT OF WEIGHTLESSNESS ON LYMPHOCYTE PROLIFERATION**
Autusto Cogoli *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 4 p

Avail: NTIS HC A08/MF A01 CSCL 06P

An experiment to study the effect of weightlessness on lymphocyte proliferation to detect possible alteration of the cells responsible for the immune response during long-duration space flights is described. Human lymphocytes in culture medium will be delivered shortly before launch in an incubator which will be kept at 37C. Mitogen will be added to the culture. A control without mitogen will be run in parallel. After 70 hours of incubation, radioactive thymidine will be added. After two hours, cellular activity will be stopped by fixation and incubator power switched off. Later, the amount of incorporated thymidine will be determined and the cell morphology and the distribution of cell organelles will be investigated. R.J.F.

**N82-18262*#** Rome Univ. (Italy).
**THREE-DIMENSIONAL BALLISTOCARDIOGRAPHY IN WEIGHTLESSNESS**
A. Scano *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 4 p

Avail: NTIS HC A08/MF A01 CSCL 06E

An experiment is described the aim of which is to record a three dimensional ballistocardiogram under the condition of weightlessness and to compare it with tracings recorded on the same subject on the ground as a means of clarifying the meaning of ballistocardiogram waves in different physiological and perphaps pathological conditions. Another purpose is to investigate cardiovascular and possibly fluid adaptations to weightlessness from data collected almost simultaneously on the same subjects during the other cardiovascular during the other cardiovascular and metabolic experiments. R.J.F.

**N82-18264*#** Stirling Univ. (Scotland).
**MASS DISCRIMINATION DURING WEIGHTLESSNESS**
Helen Ross *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06S

An experiment concerned with the ability of astronauts to discriminate between the mass of objects when both the objects and the astronauts are in weightless states is described. The main object of the experiment is to compare the threshold for weight-discrimination on Earth with that for mass-discrimination in orbit. Tests will be conducted premission and postmission and early and late during the mission while the crew is experiencing weightlessness. A comparison of early and late tests inflight and postflight will reveal the rate of adaptation, to zero-gravity and 1-g. The mass discrimination box holds 24 balls which the astronaut will compare to one another in a random routine. R.J.F.

**N82-18265*#** Pennsylvania Univ., Philadelphia.
**NUTATION OF HELIANTHUS ANNUUS IN A MICROGRAVITY ENVIRONMENT**
Allan H. Brown *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06C

An experiment to gather evidence to decide between the Darwinian concept of endogenously motivated nutation and the more mechanistic concept of gravity dependent nutation is described. If nutation persists in weightlessness, parameters describing the motion will be measured by recording in time lapse mode the video images of a population of seedlings that were grown at 1-g, but which will be observed at virtual zero gravity. Later, the plant images will be displayed on a video monitor in a laboratory, photographed on 16 millimeter film, and analyzed frame by frame to determine the kinetics of nutation for each specimen tested. R.J.F.

**N82-18266*#** State Univ. of New York at Binghamton.
**PRELIMINARY CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS DURING SPACE FLIGHT: NEUROSPORA AS A MODEL SYSTEM**
Frank W. Sulzman *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06P

The effects of the Spacelab environment on the circadian rhythms in microorganisms are investigated. Neurospora is chosen because of its well characterized circadian rhythm of growth. Growth rate, banding patterns, and circadian period and phase information are studied. B.W.

**N82-18267*#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Aachen (West Germany). Abteilung Biophysik.
**MICROORGANISMS AND BIOMOLECULES IN SPACE HARD ENVIRONMENT**
G. Horneck *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06C

Microorganisms and biomolecules exposed to space vacuum and to different intensities of selected wavelengths of solar ultraviolet radiation is studied. The influence of these factors, applied singly or simultaneously, on the integrity of microbial systems and biomolecules is measured. Specifically, this experiment will study in Bacillus subtilis spores (1) disturbances in subsequent germination, outgrowth, and colony formation; (2) photochemical reactions of the DNA and protein in vivo and in vitro and their role in biological injury; and (3) the efficiency of repair processes in these events. B.W.

**N82-18268*#** San Francisco Univ., Calif.
**RADIATION ENVIRONMENT MAPPING**
E. Y. Benton *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06R

An experimental set up to map the cosmic radiation fieldinside the Spacelab vehicle to determine the potential biological hazards present is described. In addition to the integral linear energy transfer (LET) spectrum for protons and HZE particles, the parameters to be determined include the total radiation dose; fluence of neutrons, protons, and high charge and energy (HZE) particles. These results are to be derived from measurements made in passive dosimeters. B.W.

**N82-18269*#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Aachen (West Germany). Abtelung Biophysik.
**ADVANCED BIOSTACK EXPERIMENT**
H. Buecker *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06R

The Advanced Biostack Experiment is described. The objectives are: (1) to confirm, complement, and enlarge the information obtained from the previous experiments by applying improved and advanced methods of localization and physical and biological evaluation, performing advanced experiments based on these data, and including additional biological specimens and additional radiation detectors; (2) to determine the biological importance of nuclear disintegration stars; (3) to determine the interference of HZE particle induced effects with those of other space flight factors (e.g., weightlessness); and (4) to determine the distribution of HZE particles and of disintegration stars at different locations inside the module and on the pallet. B.W.

**N82-18854*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PHYSIOLOGICAL RESPONSES TO PROLONGED BED REST AND FLUID IMMERSION IN MAN: A COMPENDIUM OF RESEARCH (1974 - 1980)**
John E. Greenleaf, Lori Silverstein (San Jose State Univ.), Judy Bliss, Vicki Langenheim, Heidi Rosson (California Univ., Davis), and Clinton Chao (California Univ., Berkeley) Jan. 1982 112 p
(NASA-TM-81324; A-8709) Avail: NTIS HC A06/MF A01 CSCL 06S

Water immersion and prolonged bed rest reproduce nearly all the physiological responses observed in astronauts in the weightless state. Related to actual weightlessness, given responses tend to occur sooner in immersion and later in bed rest. Much research was conducted on humans using these two techniques, especially by Russian scientists. Abstracts and annotations of reports that appeared in the literature from January 1974 through December 1980 are compiled and discussed. Author

**N82-18855#** Ohio State Univ., Columbus. Dept. of Veterinary Pathobiology.
**MOLECULAR INTERACTIONS OF HIGH ENERGY FUELS AND JET FUELS WITH ONCOGENIC VIRUSES AND ENDOGENOUS VIRUSES Annual Report, 31 Jul. 1980 - 15 Sep. 1981**
James R. Blakeslee, Jr. Oct. 1981 110 p refs
(Contract F49620-80-C-0087; AF Proj. 2312)
(AD-A108377; AFOSR-81-0765TR) Avail: NTIS HC A06/MF A01 CSCL 06/2

The objectives of this research are to develop rapid in-vitro assays to evaluate the carcinogenic potential of chemicals used by the U.S. Air Force. Snyder-Theilen Feline Sarcoma Virus (ST FeSV), quantitatively transforms human skin fibroblasts following second order kinetics. These studies were performed in order to determine whether chemicals altered ST FeSV transformation in a predictable manner and to correlate the alteration with the carcinogenic or non-carcinogenic activity of the text chemical. The results, to date, show diverse carcinogens classed as: aromatic amines, polycyclic hydrocarbons, Aminofluorenes, hydrazines, asbestos and mycotoxins inhibited virus transformation when virus infected cells (2 hours post-infection) were exposed to test chemical, while non-carcinogenic chemicals had no significant effect on transformation. Triton X-100, acetone, petroleum and shale oil derived JP5; RJ5 and diesel fuel, marine, demonstrated non-carcinogenic activity while formaline demonstrated carcinogenic activity. Experiments designed to show the specificity of the antagonistic effect of known carcinogens are reported. Disulfuram inhibits biotransformation of 1,2 symmetrical dimethyl hydrazine (SDMH) metabolites, azomethane to azoxymethane (ultimate carcinogen) thereby preventing carcinogenic effect of the proximate carcinogen SDMH. Detailed methodology required to ascertain effect of chemicals on ST FeSV pro-virus integration and synthesis are presented. GRA

**N82-18857** Royal Aircraft Establishment, Farnborough (England) Engineering Physics Dept.
**SCATTER DIAGRAMS BASED ON THE ANTHROPOMETRIC SURVEY OF 2000 ROYAL AIRFORCE AIRCREW (1970/1971)**
R. E. Simpson and E. Violet Hartley 10 Feb. 1981 154 p refs
(RAE-TR-81017; RAE-EP-763; BR79375) Copyright. Avail: Issuing Activity

An anthropometric survey was conducted in order to provide information for aircrew clothing, personal equipment and aircraft workspace design purposes. Scatter diagrams of pairs of measurements of value to engineers, ergonomists or clothing designers who require information on the interrelationship between specific measurements are presented. Each subject is represented by a pair of coordinates, x and y, which represent the two measurements considered. Information on the number of subjects to which the diagram relates, means of x and y variate values, correlation coefficient, and regression equations for the x and y variates are given. Functional clothing sizing is based on two control measurements, e.g., stature and chest circumference for one piece coveralls. Author (ESA)

**N82-18858*#** National Aeronautics and Space Administration, Washington, D. C.
**MISSION OPERATION REPORT: SPACE SHUTTLE PROGRAM. STS-2 POSTFLIGHT MEDICAL OPERATIONS**
29 Jan. 1982 23 p
(NASA-TM-84135; E-989-81-02) Avail: NTIS HC A02/MF A01 CSCL 06S

The STS-2 mission presented the NASA medical team with a series of operational problems associated with the potential contamination of the onboard potable water and altered work/rest cycles. The first problem was traced to the inflight malfunctioning fuel cell, while the second was attributed to the modification of in-flight crew timelines in order to maximize the scientific data acquisition. Shortened sleep period, heavy work loads, inadequate time allocation for food preparation and consumption and estimated low water intake, though tolerable for a 54 hour mission, would have been unacceptable for a longer misson. A contingency plan was developed to restructure in-flight time-lines and institute corrective health maintenance procedures in the event that the mission was extended beyond 54 hours. Minor losses of medical data occurred as a result of the shortened mission duration. All phases of the mission required real-time re-evaluation, identification of potential impact on preexisting medical constraints, and development of appropriate recommendations and solutions. The activities required significant coordination among the different teams involved in medical operations. N.W.

**N82-18859*#** Houston Univ., Tex. Dept. of Chemistry.
**ANALYSIS OF VOLATILE METABOLITES IN BIOLOGICAL FLUIDS AS INDICATORS OF PRODROMAL DISEASE CONDITION Final Report**
A. Zlatkis Jan. 1982 25 p refs
(Contract NAS9-15882)
(NASA-CR-167513) Avail: NTIS HC A02/MF A01 CSCL 06E

The volatile profile cannot be defined as a single class of substances, rather it is a broad spectrum of materials of different polarities characterized by having a boiling-point in the low to medium range (up to approximately 300 C) and the fact that the compounds are suitable for gas chromatography without derivatization. The organic volatile profiles are very complex mixtures of metabolic byproducts, intermediates, and terminal products of enzymatic degradations composed mainly of alcohols, ketones, aldehydes, pyrazines, sulfides, isothiocyanates, pyrroles, and furans. The concentration of organic volatiles in biological fluids covers a wide range with many important components present at trace levels. The complexity of the organic volatile fraction requires the use of capillary columns for their separation. T.M.

**N82-18860#** Texas Univ. at Arlington. Dept. of Mathematics.
**STATISTICAL TOOLS FOR DETERMINING FITNESS TO FLY Final Report, Sep. 1978 - Mar. 1980**
Patrick L. Brockett and Gerald A. Shea Brooks AFB, Tex. School of Aerospace Medicine Sep. 1981 44 p refs
(Contract F33615-78-C-0623; AF Proj. 7755)
(AD-A108599; SAM-TR-81-20) Avail: NTIS HC A03/MF A01 CSCL 12/1

The goal of this project is to use data from regularly scheduled physical examinations to estimate the probability of an event such as a heart attack. This is done via the construction of a mathematical model. A high probability of an event as computed by the model would be evidence of a high risk case. The model developed here, termed the periodic checkup predictive model, is a survival distribution model similar to the proportional hazards model when there is little or no loss to followup and to logistic regression when the object is to predict the occurrence of an event during a fixed interval of time. Author (GRA)

**N82-18861#** European Space Agency, Paris (France).
**EVALUATION OF THE VISUAL ACQUISITION RANGE OF ENROUTE AIR TRAFFIC FROM COCKPIT OBSERVATIONS**
Otto Weber Oct. 1981 56 p refs Transl. into ENGLISH from 'Bestimmung der visuellen Auffassreichweite von Verkehrsflugzeugen im Streckenglug aus Beobachtungen im Cockpit', Rept. DFVLR-Mitt-80A-14 DFVLR, Brunswick, West Germany, Sep. 1980 53 p
(ESA-TT-691; DFVLR-Mitt-80-14) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 11.90

Onboard observations and approach lead time measurements are employed. The results of 29 measurement campaigns conducted by airline pilots are analyzed. Evaluation methods are described and problems due to converging courses and large cross track distances in the head-on case are treated. The results for the acquisition range and the apperent size of the intruder derived from this range are discussed. The advantages of anticollision and position lights, vapor trials and air traffic control signals for the acquisition process are demonstrated. Data acquisition improvements are suggested. Author (ESA)

**N82-18862#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.
**RESEARCH PREDICTIONS FOR UNDERWATER ACTIVITIES IN THE 1980'S [FORSKNINGSBEHOV INOM 1980-TALETS UNDERVATTENSVERKSAMHET]**
Bo Cassel Oct. 1981 29 p In SWEDISH
(FOA-C-58010-H1) Avail: NTIS HC A03/MF A01

Present developments show that technical equipment compliments the diver's work and makes it easier, but cannot take the place of the diver. In bell diving a depth of 700 m was reached in 1981. Data from North Sea diving under harsh weather conditions were studied and make up, to a certain extent, the background of research and development in the next decade. Oil and gas resources at depths between 300 and 600 m will be exploited at that time. Diving at such depths involves special problems. Safety requirements for divers are addressed. Author (ESA)

**N82-18863#** Ohio State Univ., Columbus. Coll. of Medicine.
**STUDY OF CHLORINE DIOXIDE AND ITS METABOLITES IN MAN**
Joseph R. Bianchine, Judith R. Lubbers, Sudha Chauhan, and Judy Miller Sep. 1981 100 p refs
(Grant EPA-R-805643)
(PB82-109356; EPA-600/1-81-068) Avail: NTIS HC A05/MF A01 CSCL 06T

An assessment of the relative safety of chronically administered chlorine water disinfectants in man was undertaken. A rising dose tolerance investigation examined the effects of single dose increasing concentration administration of chlorine disinfectants to normal healthy adult male volunteers. The impact on normal subjects of twelve week daily ingestion of the disinfectants was addressed. Physiological impact was assessed by evaluation of a large battery of qualitative and quantitative tests. In general, the study affirmed the relative safety and tolerance of normal healthy adult males and normal healthy adult male glucose-6-phosphate dehydrogenase deficient individuals to daily twelve week ingestion of 500 mL of chlorine disinfectants at a concentration of 5 mg/L. GRA

**N82-18864#** Midwest Research Inst., Kansas City, Mo.
**HYDROGEN CYANIDE HEALTH EFFECTS Final Report**
Bonnie L. Carson, Larry H. Baker, Betty L. Herndon, Harry V. Ellis, III, and Eileen M. Horn Sep. 1981 71 p refs
(Contract EPA-68-03-2928)
(PB82-116039; EPA-460/3-81-026) Avail: NTIS HC A04/MF A01 CSCL 06T

Health effects literature primarily related to inhalation exposures to hydrogen cyanide was collected, evaluated, tabulated and summarized. Approximately 170 documents were collected from computerized and manual literature searches covering the period 1899-1981. Pharmacologists and an M.D. epidemiologist rated the documents according to their applicability to the study and their methodology. The approximately 20 documents considered useful for deriving a range of concern for human exposure to hydrogen cyanide from automotive emissions were tabulated. The 25 pages of tables detail the results of acute and repeated dose testing of mice, rats, guinea pigs, rabbits, cats, monkeys, dogs, goats, donkeys and humans as well as human occupational studies. Most of the documents evaluated are described in an annotated bibliography. GRA

**N82-18865#** Midwest Research Inst., Kansas City, Mo.
**AMMONIA HEALTH EFFECTS Final Report**
Bonnie L. Carson, Harry V. Ellis, III, Cecily M. Beall, and Larry H. Baker Sep. 1981 108 p refs
(Contract EPA-68-03-2928)
(PB82-116047; EPA-460/3-81-027) Avail: NTIS HC A06/MF A01 CSCL 06T

Health effects literature primarily related to inhalation exposures to ammonia was collected, evaluated, tabulated, and summarized. Appoximately 200 documents were collected from computerized and manual literature searches covering the period 1886-1981. Pharmacologists and an M.D. epidemiologist rated the documents according to their applicability to the study and their methodology. The approximately 50 documents considered useful for deriving a range of concern for human exposure to ammonia from automotive emissions were tabulated. The 50 pages of tables detail the results of acute, repeated dose, and chronic testing of bats, mice, rats, guinea pigs, chickens, rabbits, cats, monkeys, dogs, turkeys, swine, and humans as well as human occupational and accidental studies. Most of the documents evaluated are described in an annotated bibliography. GRA

**N82-18866*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**EFFECT OF TACTILE VIBRATION ON ANNOYANCE TO SYNTHESIZED PROPFAN NOISE**
Sherman A. Clevenson Dec. 1981 16 p refs Presented at the 102nd Meeting of the Acoust. Soc. of Am., Miami Beach, Fla., 1-4 Dec. 1981
(NASA-TM-83258) Avail: NTIS HC A02/MF A01 CSCL 05H

Design information that maximizes passenger comfort for propfan aircraft is presented. Predicted noise and vibration environments and the resultant passenger acceptability were studied. The effect of high frequency tactile vibration (i.e., greater than 30 Hz) on passenger reactions was analyzed. Passenger reactions to a wide range of noise with and without tactile vibration was studied. The passenger ride quality simulator was employed using subjects who evaluated either synthesized propeller noises only, or these noises combined with seat/arm vibration. The noises ranging from 80-100 dB consisted of a turbulent boundary layer noise with a factorial combination of five blade passage frequencies (50-200 Hz), two harmonic rolloffs, and three tone/noise ratios. It is indicated that passenger reaction (annoyance) to noise is not significantly changed in the presence of tactile vibration. E.A.K.

**N82-18867#** Illinois Univ., Urbana-Champaign. Engineering-Psychology Research Lab.
**TIME-SHARING MANUAL CONTROL AND MEMORY SEARCH: THE JOINT EFFECTS OF INPUT AND OUTPUT MODALITY COMPETITION, PRIORITIES AND CONTROL ORDER**
Michael Vidulich and Christopher D. Wickens Dec. 1981 61 p refs
(Contract N00014-79-C-0658; NR Proj. 196-158)
(AD-A108721; EPL-81-4/ONR-81-4) Avail: NTIS HC A04/MF A01 CSCL 05/1

This report addresses some of the issues that must be considered as voice recognition and synthesis (VRAS) technology is integrated into complex man-machine system environments. These issues include the input and output channels demanded by competing activities, task difficulty or workload, the allocation of attention and the nature of the task that - spatial or verbal - will be interfaced with VRAS. The present experiment addresses primarily the first three issues within the framework of multiple resource theory. Ten subjects performed first and second order tracking tasks either alone or concurrently with a Sternberg Memory Search Task with a set size of three letters. In different conditions the memory search task was presented either auditorily (A) or visually (V), and responses were executed with either a speech response (S), or manually (M). These generated four input/output combinations: AS, VS, AM, VM, that could be defined in terms of an increasing degree of resource overlap with the VM tracking task. GRA

**N82-18868#** Colorado Univ. at Boulder. Inst. of Cognitive Science.
**HOW AN UNFAMILIAR THING SHOULD BE CALLED**
Patricia Baggett and Andrzej Ehrenfeucht Nov. 1981 33 p refs
(Contract N00014-78-C-0433; NR Proj. 157-422)
(AD-A109179; TR-111-ONR) Avail: NTIS HC A03/MF A01 CSCL 05/10

An empirical method is described to derive good names for unfamiliar objects. Three principles were used in deriving the names: (1) The vocabulary and structure of the names should be within the user's linguistic capacities; (2) the names should be informationally efficient, namely, short, but at the same time unique; and (3) the names should form a classification system. For example, most names have a generic term and one or more modifiers. These principles lead to the following design for creating good names: Step 1: Names are generated by a group of subjects. Step 2: From the names generated by subjects, the experimenter chooses a subset of the names according to the following criteria: (a) the modal name is chosen, namely, if a particular name is generated more often than others, it is chosen; (b) shorter names are preferred; (c) names chosen stay within the classification system provided by the subjects. Step 3: How good the names are is tested by measuring (1) how well people can match the names with the objects they describe; and (2) how well they can recall the names, given the physical objects. Steps 2 and 3 can be iterated; namely, if a given name is poorly matched or recalled, it can be replaced by another generated name and tested again. The method results in names that form a classification system and that are natural, short, well matched with their physical referents and well recalled. GRA

**N82-18869#** Technische Hogeschool, Delft (Netherlands). Lab. for Measurement and Control.
**IDENTIFICATION OF THE ADAPTIVE FEEDBACK OF THE HUMAN MOTOR SYSTEM USING THE RESPONSE DIFFERENCE METHOD (RDM)**
Ton Eland Jul. 1981 131 p refs
(WTHD-134) Avail: NTIS HC A06/MF A01

The role of proprioceptive and visual feedback in generating slow, goal directed movements was investigated using a cybernetic model. The physiological structure of the movement control system is reflected by a feedforward path and a parallel feedback loop. Psychological schemata identified in the feedforward path are the internal model of the task, and the internal model of the motor system load. The RDM uses the differences between a routine and a disturbed response to identify the feedback system. The method was tested by computer simulation and a control stick positioning task. Correlation between model and measured results is >0.95. Visual feedback is only used for a continuous readjustment of the proprioceptive position sense. Proprioceptive feedback tuning is dependent of the velocity of the planned movement. The proprioceptive velocity feedback adapts within 130 msec to an increase in the mass which is moved. Proprioceptive feedback does not adapt to a decreasing mass and/or a changing damping of the load. Author (ESA)

**N82-18870*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**STS-2 INDUCED ENVIRONMENT CONTAMINATION MONITOR (IECM): QUICK-LOOK REPORT**
E. R. Miller, ed. Jan. 1982 76 p refs
(NASA-TM-82457) Avail: NTIS HC A05/MF A01 CSCL 06K

The STS-2/induced environment contamination monitor (IECM) mission is described. The IECM system performance is discussed, and IECM mission time events are briefly described. Quick look analyses are presented for each of the 10 instruments comprising the IECM on the flight of STS-2. A short summary is presented. S.L.

**N82-18871*#** George Washington Univ., Washington, D.C. Science Communication Div.
**BIBLIOGRAPHY ON CARBOHYDRATE SYNTHESIS. SELECTED WORKS, 1861 - 1981**
Patricia A. Dufour Jul. 1981 25 p Presented at Workshop on Carbohydrate Synthesis in a Controlled Ecological Life Support System (CELSS), Elkridge, Md., 23-27 Jun. 1981
(Contract NASw-3165)
(NASA-CR-168553) Avail: NTIS HC A02/MF A01 CSCL 07C

International in scope, this bibliography cites 220 articles books, patents, and conference proceedings related to carbohydrate synthesis. The works are listed alphabetically by author in the following categories: (1) experimental and industrial chemistry; (2) space travel and feeding studies; (3) hardware; and (4) general reviews and progress. A.R.H.

**N82-18872#** Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Flugzeuge.
**FLIGHT ERGONOMICS IN THE AIRCRAFT INDUSTRY PERSONNEL-ERGONOMIC DEVELOPMENT [FLUGERGONOMIE IN DER LUFTFAHRTINDUSTRIE MIT BESONDERER BERUECKSICHTIGUNG PERSONAL-ERGONOMISCHER ENTWICKLUNGEN]**
Ruediger Seifert 4 Jun. 1981 23 p refs In GERMAN
(MBB-FE-301/S/PUB/44) Avail: NTIS HC A02/MF A01

Management systems applied to evaluate qualitative and quantitative personnel requirements for maintaining the man machine system (MMS) were determined. Qualitative personnel requirements are plant operation, attendance, maintenance/placement of the MMS needed, professional specialty, and job qualification. In quantitative personnel requirement the number of needed manpower is determined for every professional specialty and area. Personnel selection is recommended for activities, special abilities, performance, and skills. Personnel selection should be made according to these criteria. It is concluded that ergonomic measures are necessary in the development process of the MMS. Transl. by E.A.K.

**N82-18873#** Boeing Aerospace Co., Seattle, Wash. Engineering Technology Div.
**HUMAN ENGINEERING PROCEDURES GUIDE Final Report, 2 Apr. - 2 Dec. 1979**
Charles W. Geer Sep. 1981 245 p refs
(Contract F33615-79-C-0520)
(AD-A108643; D180-25471-1) Avail: NTIS HC A11/MF A01 CSCL 05/5

Human engineering (HE) procedures during the system acquisition process are presented for the assistance of various Air Force and industry personnel. The guide is divided into three parts. The first part of the guide is introductory material which scopes the effort and defines HE and human factors engineering (HFE). The second part provides guidance to Air Force and industry management. The third, and last part is the largest section and it provides assistance to both Air Force and industry persons assigned direct responsibility for HE. The management portion shows current management aspects of the HE process utilizing directives, specifications, regulations and pamphlets. HE activities are described in general terms of both what should be done and when it should be accomplished. GRA

**N82-18874#** National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
**ACTIVITIES OF THE COMMITTEE ON HUMAN FACTORS: OCTOBER 1, 1980 - SEPTEMBER 30, 1981 Annual Summary Report**
Robert T. Hennessy 30 Nov. 1981 22 p
(Contract N00014-81-C-0017; NR Proj. 196-167)
(AD-A108606) Avail: NTIS HC A02/MF A01 CSCL 05/1

The Committee on Human Factors was established and held its first meeting in December 1980. The three principal accomplishments of the committee during the reporting period were: (a) identifying critical problems in human factors and formulating preliminary statements defining the nature of these problems and the basic research needed to alleviate these problems; (b) establishing membership and guidelines for a special working group on simulation; and (c) planning the conduct of a workshop on applied methodologies that will identify some methodologies suitable for presentation at a tutorial symposium and other methodologies deserving research support. GRA

**N82-18875*#** Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
**MODELING HUMAN ATTENTION ALLOCATION STRATEGIES WITH COMPETING CRITERIA Final Report, Mar. - Aug. 1981**
Thiruvenkatasamy Govindaraj Oct. 1981 22 p refs
(Grant AF-AFOSR-0144-81; AF Proj. 2313)
(AD-A108509; AFOSR-81-0785TR) Avail: NTIS HC A02/MF A01 CSCL 05/8

In supervisory control situations involving multiple human operators, proper cooperation and coordination is essential. In addition to their individual tasks, the operators are jointly responsible for certain tasks. It is usually not clear when and who should take responsibility for the joint tasks. Proper scheduling of tasks and appropriate allocation of resources are necessary for optimal performance, and in some instances, for overall safety. Understanding how multiple operators interact requires the understanding of single operator performance. A model based on Pareto optimality and Fuzzy Set theory was developed for the human operation. An experimental paradigm had been developed earlier to study the human monitor. The scenario used was similar to monitoring the spread of forest fires, and timely identification of threatening conditions. Experiments were conducted based on the paradigm. Results showed that the operators used updates to reduce the uncertainty to a sufficiently low level before starting threat classification. Sites where the probability of damage was close to 0.5 were more difficult to classify. Author

**N82-19147*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**ENVIRONMENTAL CONTROL SYSTEMS**
Frank Hrach *In* NASA. Langley Research Center Elec. Flight Systems Feb. 1982 p 247-252

Avail: NTIS HC A12/MF A01 CSCL 06K

Materials illustrating a presentation on environmental control systems for electric flight systems are presented. The major technology issues, major development and application steps, the role of NASA, and required flight testing are outlined. J.D.H.

**N82-19808** Texas A&M Univ., College Station.
**BIOCHEMICAL, PHYSIOLOGICAL AND ECOLOGICAL ASPECTS OF AMMONIUM REGENERATION BY MARINE CRUSTACEANS Ph.D. Thesis**
Robert Richard Bidigare 1981 122 p
Avail: Univ. Microfilms Order No. 8128874

Laboratory investigations were carried out with the marine mysid, Praunus flexuosus, to assess the degree of coupling between glutamate dehydrogenase (GDH) activity and the rate of whole animal ammonium excretion. A strong correlation between GDH activity and rate of ammonium excretion by this mysid confirmed that ammonium excretion rates could be accurately predicted by employing the enzyme assay presented here. GDH activity surveyed in different taxa of marine crustaceans was higher in muscle tissue extracts than in gill tissue extracts or in a whole animal homogenate. Zooplankton excretion experiments conducted during austral spring and summer in the Scotia Sea, Antarctica, showed that weight-specific ammonium excretion increased both with increasing ambient temperature and with decreasing body size. The GDH assay appears useful as an alternative method to the traditional time-course, animal-in-a-jar experiments for quantifying zooplankton excretion impacts in the world oceans. Used in conjunction with the ETS assay, the GDH assay is a sensitive tool for surveying depths of maximal grazing and/or predation. Dissert. Abstr.

**N82-19809*#** General Electric Co., Fairfield, Conn. Space Div.
**LIFE SCIENCES PASSIVE GN2 FREEZER THERMAL PERFORMANCE TEST Summary Report**
G. W. Belshaw 13 Nov. 1981 79 p
(Contract NAS9-15629)
(NASA-CR-167546) Avail: NTIS HC A05/MF A01 CSCL 06C

Thermal performance tests that were conducted on the life sciences passive GN2 freezer project are summarized as well as the improvements to the freezers to improve the thermal performance of the containers. Procedures were developed, based upon these tests, to initially charge the freezers with LN2 and verify that the freezer performance is adequate for the mission duration. Improvements were made to the corvac sample tube to limit the amount of breakage due to thermal expansion of the liquid during freezing. A method of verifying the freezer vacuum insulative integrity was defined as well as a procedure for refurbishment of the internal vacuum level. Freezer modifications were made to ease the reevacuation of the containers. The orientation of the freezer in a 1-G environment, after being charged, had to remain in a vertical position. The LN2 boiloff rate increased significantly in a horizontal position. This resulted in a stowage definition in the spacecraft prior to launch. Functional testing, using the SL-1 mission timeline showed that the freezer will maintain samples in the frozen state for the duration of the mission. S.L.

**N82-19810#** Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
**STUDY OF THE KINETICS OF OXYGEN SATURATION OF FLUOROCARBON EMULSIONS**
Yu. D. Aprosin, V. K. Alekseeva, and N. I. Afonin 1982 20 p refs Transl. into ENGLISH from Vop. Med. Khim. (Russia), v. 26, no. 6, 1980 p 793-799
(ISSN-0077-5606; NRC/CNR-TT-2007) Avail: NTIS HC A02/MF A01

The use of fluorocarbon emulsions as blood substitutes is addressed. Specifically, the mechanism of oxygen absorption by perfluorotributyl amine (PFTBA) emulsions is examined. The functional dependence of the absorption constant on various parameters (viscosity, temperature, and concentration of PFTBA in the emulsion) was established, and a comparative analysis of the efficiency of gas transport by the emulsion and by blood was carried out. M.G.

**N82-19811#** Ball State Univ., Muncie, Ind. Dept. of Biology.
**DETERMINATION UF THE EFFECTS OF MATERIAL FROM ALTERNATE ENERGY SOURCES ON THE UPPER RESPIRATORY TRACT CLEARANCE MECHANISM. PART 1: IN VITRO EXPOSURE TO PARTICULATE POLLUTANTS. PART 2: IN VIVO EXPOSURE TO OZONE Final Report**
Dorothy Adalis Sep. 1981 75 p refs
(Contract EPA-68-02-2295)
(PB82-117037; EPA-600/1-81-067) Avail: NTIS HC A04/MF A01 CSCL 06T

Studies were conducted to measure the toxic effects of a variety of substances from the environment on the clearance mechanism of the upper respiratory tract using an in vitro hamster model system. Studies using hamsters for in vivo exposures to ozone were also conducted to determine the effects of ozone on the cilia beat frequency and cytopathology of the tracheal epithelium. Organ cultures of hamster tracheal tissue were exposed to graded concentrations of pollutants to determine effects on the respiratory cilia. Parameters studied were beat frequency, ciliostasis, cytopathology, and ATP concentration. GRA

**N82-19812** Utah Univ., Salt Lake City.
**NUMERICAL AND EXPERIMENTAL STUDIES OF ELECTROMAGNETIC NEAR-FIELD ENERGY ABSORPTION IN MODELS OF MAN Ph.D. Thesis**
Indira Chatterjee 1981 156 p
Avail: Univ. Microfilms Order No. 8125898

The Plane Wave Spectrum approach was used to numerically evaluate the electromagnetic fields and energy absorption in models of man subjected to near-zone leakage fields. Three models were considered: a homogeneous semi-infinite slab model, a layered slab model, and an inhomogeneous 180 cell block model. The numerical results show the strong dependence of energy absorption on the characteristics of the prescribed leakage fields. Results are presented, both for plane waves at various angles of incidence and for near-zone leakage fields. The importance of phase and amplitude variations in the prescribed leakage field is evaluated. A highlight of this work is the considerably reduced energy absorption for near-field partial-body exposures as compared to that obtained for far-field exposure conditions. Experimental results supporting the validity of the empirical relationships are presented. Dissert. Abstr.

**N82-19813** Texas A&M Univ., College Station.
**CATECHOLAMINE LEVELS IN FIT AND NONFIT MALES WHEN EXPOSED TO AN EMOTIONAL STRESS Ph.D. Thesis**
Camille Jeanette Bunting 1981 123 p
Avail: Univ. Microfilms Order No. 8128877

The difference in catecholamine (CA) excretion levels and perceived anxiety levels between physically fit and nonfit human subjects when exposed to an emotional stress was studied. The differences in heart rate responses between physically fit and nonfit subjects, as well as the difference in CA excretion levels and perceived anxiety levels between individuals classified as introverts and extraverts were also studied. Rock climbing was selected as the experimental stress factor. The results of the analysis for the fit and nonfit classifications indicated significant differences in epinephrine (E) excretion levels and responses on the Spielberger State Anxiety Inventory (SSAI) between treatments, as well as significant groups x treatments interaction for norepinephrine (NE) excretion levels. Significant groups x treatments x times and treatments x times x activities interactions were found for heart rate. Analysis for the introvert and extravert classifications revealed significant differences in NE excretion levels and SSAI responses between treatments, as well as a significant groups x treatments interaction for E excretion levels. Dissert. Abstr.

**N82-19814*#** General Electric Co., Houston, Tex. Systems Dept.
**ANALYSIS OF EVAPORATIVE WATER LOSS IN THE SKYLAB ASTRONAUTS**
J. I. Leonard 19 Dec. 1977 77 p refs
(Contract NAS9-14523)
(NASA-CR-167462) Avail: NTIS HC A05/MF A01 CSCL 06P

Daily evaporative water losses (EWL) during the three Skylab missions were measured using the indirect mass and water balance techniques. A mean inflight EWL of 860 ml/day-m 2 was obtained for nine men who averaged one hour of daily exercise. Although it was expected the EWL would increase in the hypobaric environment of Skylab (1/3 atmosphere), an average decrease from preflight sea level conditions of 11 percent was measured. The results suggest that weightlessness may have been a factor in modifying EWL primarily by decreasing sweat losses during exercise and possibly by reducing insensible skin losses as well. The weightless environment apparently promotes the formation of a sweat film on the skin surface both directly, by reducing heat and mass convective flow and sweat drippage, and perhaps indirectly by inducing measurable biochemical changes resulting in high initial sweating rates. It is proposed that these high levels of skin wettedness favor sweat suppression by a previously described mechanism. Author

**N82-19815*#** Baylor Univ., Houston, Tex. Dept. of Dermatology.
**EVALUATION OF MATERIALS PROPOSED FOR USE IN SPACE FLIGHT Final Report**
W. Christopher Duncan Aug. 1981 4 p
(Contract NAS9-16358)
(NASA-CR-167537) Avail: NTIS HC A02/MF A01 CSCL 06Q

The cutaneous primary irritancy and allergenicity potential of cotton shirts/fabrics treated with flame retardants were evaluated in order to establish their suitability for spacecraft crew use. Twenty-five volunteer human subjects were patch tested on the back utilizing standard methodology, with both treated and untreated cotton fabric. The fabric was treated with tetrakis (hydroxymethyl) phosphonium hydroxide and subsequently cured with gaseous ammonia. The final treatment comprised adding on dicyandiamine phosphoric acid. None of the individuals experienced primary irritant or allergic reactions attributable to the fabric during induction or challenge patch testing. Likewise, there were no reactions to treated or untreated fabric patches placed on ten subjects of the usage panel at the conclusion of the study. R.J.F.

**N82-19816#** Communications Research Centre, Ottawa (Ontario). Informatics Applications Management Branch.

### REVIEW OF HEALTH AND SAFETY ASPECTS OF VIDEO DISPLAY TERMINALS

W. C. Treurniet Feb. 1982 39 p refs
(CRC-TN-712-E) Avail: NTIS HC A03/MF A01

The factors that contribute to worker complaints when video display terminals (VDT) are introduced into the workplace are investigated. Survey data from field experiments indicate that a number of ergonomic factors and job characteristics can contribute to reports of discomfort from VDT users. Specifically, reports of visual discomfurt are related to improper ambient lighting (which can cause bothersome reflections and contrast glare), poor display quality, and ophthalmological deficiencies. Reports of muscle pain and fatigue are related to poor workstation design such as improper heights of chair, keyboard, and display screen, and absence of source document holder, and no support for the forearms and wrists. It is noted that the frequency of such complaints is influenced by the worker's attitude regarding the job. A negative attitude arising from performing a meaningless, routine task, or from having no opportunities for career advancement, will result in more complaints due to ergonomic shortcomings. The issue of electromagnetic emissions from television displays is also considered. B.W.

**N82-19817#** European Space Agency, Paris (France).

### HUMAN CARDIOVASCULAR ADAPTATION TO ZERO GRAVITY

F. Bonde-Petersen, ed., B. Battrick, comp., and J. Mort, comp. Jan. 1981 64 p refs Proceedings of Symp., Copenhagen, 20-21 Apr. 1981. Sponsored in cooperation with Copenhagen Univ.
(ESA-SP-1033; ISSN-0379-6566) Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Methods for investigating the effects of weightlessness on the human body are presented, and the physiological problems caused by zero gravity are discussed. Cardiovascular and hormonal responses, incuding hemodynamic effects and posture influence, are considered. Vestibular, brain and masticatory functions are investigated. Rebreathing techniques are assessed.

**N82-19818#** Technische Univ., Berlin (West Germany).

### CURRENT VIEWS AND FUTURE PROGRAMS IN CARDIOVASCULAR PHYSIOLOGY IN SPACE

K. Kirsch *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 3-5 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A microplethysmographic method which charts fluid shifts such as those caused by sudden exposure to zero gravity is described. An ultrasonic probe, calibrated in human tissue layer thickness, measures areas where the underlying bone provides good echos. Tissue volume is calculated from the depth of the tissue cylinder between the skin surface and the bone. Measurements on subjects undergoing tilting confirm that edema occurs preferentially in the lower third of the tibia close to the ankle. Tilting the subject from a slight head down position into the upright position is followed by a decrease of tissue layer thickness above heart level, whereas below heart level the opposite occurs. The effects are reversible. Author (ESA)

**N82-19819#** Texas Univ. Health Science Center, Dallas.

### ADAPTATION TO ZERO GRAVITY AS SIMULATED BY HEAD-DOWN TILT

C. G. Blomqvist, J. V. Nixon, R. L. Johnson, and J. H. Mitchell *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 6-7 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The accuracy of the head down tilt model of adaptation to zero gravity is assessed by comparing test results of subjects undergoing a 24 hr 5 deg tilt with measurements of heart rate, plasma volume, urine production, etc., obtained during and after space flight. The magnitude of the changes in body fluid distribution and the degree of post-tilt cardiovascular dysfunction closely resemble space results. Results indicate that the cardiovascular system adapts rapidly and efficiently to the central fluid shift that occurs early during exposure to zero gravity. Hemodynamic changes are transient with a nearly complete return to the control state within 6 hrs. The adaptation is achieved primarily by a diuresis and a decrease in blood volume, mediated by ADH, renin, and aldosterone inhibition. Author (ESA)

**N82-19820#** Kobenhavns Amts Sygehus i Glostrup (Denmark).

### CLINICAL PHYSIOLOGY OF THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM

J. Giese *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 8-9

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Methods for studying the renin-angiotensin-aldosterone system are reviewed. Plasma renin concentration measurements, referred to the international standard, are advocated as a way of standardizing measures obtained by different methods. Plasma concentration of angiotensin 2 is the most suitable measurement. Saralasin and converting enzyme inhibitors are good angiotensin 2 blockers. Tetrahydroaldosterone excretion measurement is a satisfactory method for studying aldosterone secretion.
Author (ESA)

**N82-19821#** Kommune Hospital, Copenhagen (Denmark).

### CARDIOVASCULAR REFLEXES DURING UPRIGHT POSITION

O. Henriksen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 10-12 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Control systems involved in compensatory changes in vascular conductance in response to postural changes are described. Studies of blood flow regulation in subcutaneous limb tissue during changes of vascular transmural pressure are cited. Evidence suggests that constriction of the vessels in the skin contributes to the decrease in total vascular conductance in upright position. Both remote sympathetic reflex mechanisms elicited by a decrease in baroreceptor activity, and local sympathetic (axon) reflex mechanisms elicited by venous distension participate in pressure regulation during upright position. Author (ESA)

**N82-19822#** Technische Univ., Berlin (West Germany).

### VOLUME REGULATING HORMONES AND THEIR ROLE IN THE CARDIOVASCULAR ADAPTATION TO ZERO GRAVITY

L. Roecker *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 18-20 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Neurohormonal control of plasma volume is postulated. A change in blood volume is sensed by cardiovascular receptors which transmit this information up to the central nervous system. From there two main routes are involved, the antidiuretic hormone (ADH) mechanism for the water, and the sympathetic renin-angiotensin-aldosterone-system for sodium control. Diuresis measurements during water immersion, negative pressure breathing, and prolonged bed rest support this concept. Evidence suggests that ADH is the key to volume control of the circulation system, but the low physiological concentrations of ADH, especially under weightless conditions, make detection difficult. Thermal dehydration tests indicate that factors other than osmolality control ADH secretion under long term negative water balance. Author (ESA)

**N82-19823#** Nara Women's Univ. (Japan).
**CARDIOVASCULAR RESPONSES TO ISOMETRIC EXERCISE IN SITTING AND LYING POSITION**
T. Sadamoto, F. Bonde-Petersen, and Y. Suzuki *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 21-24 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Cardiovascular responses to static exercises in the sitting and lying positions, which simulated 1 g and 0 g, were studied. Subjects were investigated during and after 2 min of sustained isometric exercise performed as knee extension, planter flexion or handgrip at a tension of 40% of maximum voluntary contraction. Heart rate, arterial pressure, and blood flow were recorded. In the two positions, where the force of gravity was varied but where the conditions in the exercising muscles were identical, there was a significant difference in mean arterial pressure (MAP). The effect of isometric exercise on MAP is reduced in the lying position due to the decreased sympathetic nervous activity (SNA). Increments in forearm blood flow and forearm vascular resistance indicate that the baroreceptors are active in both cases. Lower heart rate, MAP and forearm vascular resistance as well as increased forearm blood flow during rest in the lying as compared to the sitting position are attributed to differences in SNA.
Author (ESA)

**N82-19824#** Texas Univ. Health Science Center, Dallas.
**HEMODYNAMIC EFFECTS OF LOWER BODY POSITIVE PRESSURE**
F. A. Gaffney, E. R. Thal, W. F. Taylor, B. C. Bastian, J. A. Weigelt, J. M. Atkins, and C. G. Blomqvist *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 25-26 ref
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The way in which medical antishock trousers increase arterial pressure is examined. Supine and 60 deg head up tilt blood pressure, heart rate, forearm muscle flow, cardiac output and stroke volume measurements on healthy adults in garments with 10 and 100 mm Hg pressures are presented. Results show that the garment acts as a local, effective, nonpharmacologic, vasoconstrictor. In supine normovolemic subjects it raises pressure by increased afterload. During head up tilt, venous pooling in the legs decreases stroke volume and cardiac output.
Author (ESA)

**N82-19825#** Copenhagen Univ. (Denmark).
**CARDIOVASCULAR REACTIONS TO TILT AND LOWER BODY POSITIVE PRESSURE (LBPP)**
F. Bonde-Petersen, Y. Suzuki, T. Sadamoto, and T. Staehr-Johansen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 27-29 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The difference in the reaction of the heart towards increasing total peripheral resistance passively, as during lower body positive pressure (LBPP), and actively, as during head up tilt, is examined. Standard measures were taken of subjects tilted at 25 deg (head up, head down) and in anti-g suits inflated to 60 or 120 mm Hg. For passive increase, a substantial increase in afterload does not affect cardiac output (CO). For active increase, CO is decreased without any significant increase in afterload, due to the decreased venous return. For LBPP applied in the sitting position (where venous return also is reduced) there is no increase in venous return and CO, although mean arterial pressure rises, probably due to the mechanical compression of the vascular beds in the legs.
Author (ESA)

**N82-19826#** University Hospital, Copenhagen (Denmark).
**MEASUREMENTS OF VESTIBULAR FUNCTION**
S. Vesterhauge and K. Zilstorff *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 33-34

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Vestibular reflexes used for measuring vestibular function are discussed, including vestibular sensations, vestibular vegetative vestibulo-spinal, and vestibulo-ocular reflexes. Most human displacements consist of linear accelerations/decelerations, which stimulate otolith organs, but angular accelerations provoked by rotatory movements which stimulate the semicircular canals, give rise to more compensations, so it is on these that clinical interest centers. Understanding of the interactions between the semicircular canal otolith functions and the rest of the system is hampered by the difficulty of isolating the effect of the peripheral sense organs, since the system adapts well to defects in sensory input. Zero gravity experiments are a step towards developing more sensitive measurement techniques for vestibular functions.
Author (ESA)

**N82-19827#** Kobenhavns Amts Sygehus i Gentofte, Hellerup (Denmark).
**CEREBRAL HEMODYNAMICS AT ZERO GRAVITY**
J. Olesen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 35-36 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Investigations on the effects of weightlessness and increased gravity on cerebral pressure autoregulation in man and animals are reviewed. Mean arterial blood pressure (MABP) was altered by vasoactive drugs, by a pneumatic cuff, and by posture changes. Test pilots' medical histories and the reactions of patients subjected to extirpation of external and internal jugular veins during bilateral radical dissection for neck carcinoma are considered. Artificial spinal fluid was infused into animals in order to increase intracranial pressure. Results show that cerebral blood flow is unchanged between perfusion pressures of 60 to 150 mm Hg MABP, and that substantial increases in cerebral venous pressure do not impair intellectual capacity. Therefore high g forces during ascent and weightlessness do not overload the autoregulation mechanism.
Author (ESA)

**N82-19828#** Royal Dental Coll., Copenhagen (Denmark).
**THE ETIOLOGY OF FACIAL PAIN AS RELATED TO MASTICATORY MUSCLES**
E. Moeller *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 37-41 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The link between chewing and facial pain in subjects with functional disorders of the masticatory system was tested. Blood flow in mandibular elevators was assessed by local isotope clearance using Xenon 133. Intercuspal biting at 25% or more of full effort for 90 sec causes obstruction or impairment of blood flow in the muscles. Deliberate unilateral mastication for 90 sec in a normal subject produces post exercise hyperemia in the most vigorously acting muscles. Since the degree of activity exerted by the elevators during mastication typically exceeds 50% of full effort, only pauses between the bursts of activity in the opening movement are available for blood flow. During part of these periods stretching of the elevators limits the capacity for circulation. This suggests that impaired blood flow due to contraction is the source of the pain.
Author (ESA)

**N82-19829#** Copenhagen Univ. (Denmark).
**MEASUREMENTS OF INTRA AND EXTRACELLULAR WATER SPACES AND ELECTROLYTE CONCENTRATIONS IN HUMAN SKELETAL MUSCLE**
G. Sjoegaard *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 43-44 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A method for measuring the extracellular space in small muscle biopsies was developed. For each 70 kg body weight, 2 mCi of sup 3H inulin is injected. Extracellar water content (H2Oe) is calculated from: H2Oe ml/100 g d.w. muscle tissue = (sup 3H activity/100 g d.w. muscle tissue)/(sup 3H activity/ml plasma H2O). The magnitude of H2Oe in the soleus (high % slow twitch fibers) triceps brachii (high % fast twitch) and vastus lateralis (equal number slow and fast twitch) was calculated. The total water content was 318 (298-342) ml/100 g d.w. for the three muscles. This indicates that factors other than fiber composition, e.g., the hydrostatic effect, are responsible for H2Oe magnitude differences. The method can measure reductions in muscle water spacing in the lower body caused by adaptation to zero gravity, and whether this is accompanied by electrolyte concentration changes.
Author (ESA)

**N82-19830#** Texas Univ. Health Science Center, Dallas.
**USE OF ACETYLENE REBREATHING METHOD FOR MEASURING CARDIAC OUTPUT DURING PHYSIOLOGICAL AND CLINICAL STUDIES**
C. G. Blomqvist *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 45-46 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A modification of the acetylene rebreathing method, suitable for complex or prolonged experiments which require multiple sessions, is presented. A mixture containing 0.8% C2H2, 10% He, 30% O2 with a balance of N2 for a total bag volume of 1.5 to 2.5 l is used. Six ml of C18O is added for pulmonary diffusion capacity determination. Instantaneous C2H2 concentrations are normalized with respect to He, which is not absorbed. Comparison with the standard indocyanine green indicator dilution technique reveals no systematic error. Experimentally induced stroke volume and cardiac output differences of + or - 10% to 15% can be established by standard statistical methods in groups of 5 to 10 subjects. Author (ESA)

**N82-19831#** Copenhagen Univ. (Denmark).
**A COMPARISON BETWEEN ACETYLENE AND FREON REBREATHING FOR MEASURING CARDIAC OUTPUT DURING EXERCISE**
P. Norsk, F. Bonde-Petersen, and Y. Suzuki *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 47-49 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The suitability of freon rebreathing as a noninvasive measurement method in spaceborne microgravity cardiac output tests was examined. Cardiac output, oxygen uptake, blood pressure, and heart rate were measured for subjects with spontaneous, and subjects with forced respiratory rates during rebreathing. Comparison of their results shows that freon can replace acetylene if a spontaneous breathing rate is used, and if the end tidal gas fractions are corrected for changes in rebreathing volume. Inadequate mixing can be avoided by using an inert, insoluble gas. Author (ESA)

**N82-19832#** Odense Univ. (Denmark).
**ON-LINE, REAL-TIME DETERMINATIONS OF BREATH-TO-BREATH GAS EXCHANGE**
J. S. Lundsgaard and J. Groenlund *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 50-53 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A real-time on-line system which measures respiratory gas uptake and release in noninvasive investigations of cardiac output is described. For respiration, a hot-wire anemometer connected to the computer measures true mass gas flow. The nonlinear relation between flow rate and flow signal, which differs between gases, is accounted for by a calibration table in the computer program. Another flowmeter, which measures inspiration, is connected to the first by an alternating switch. A mass spectrometer samples 20 cu cm/min flow in order to measure partial pressures. Author (ESA)

**N82-19833#** Ohio State Univ., Columbus. College of Pharmacy.
**CHEMICAL AND MOLECULAR BIOLOGICAL ASPECTS ALKYLHYDRAZINE-INDUCED CARCINOGENESIS IN HUMAN CELLS IN VITRO Interim Report, 1 Sep. 1980 - 31 Aug. 1981**
Donald T. Witiak Sep. 1981 20 p refs
(Contract F49620-80-C-0086; AF Proj. 2312)
(AD-A109088; AFOSR-81-0864TR) Avail: NTIS HC A02/MF A01 CSCL 06/20

Carbon-14 labeled 1,1-DMH and 1,2-DMH of high specific activity were prepared and utilized, along with 14C-labeled MMH, to study alkylation of DNA and proteins in low passage human neonatal foreskin derived fibroblasts. When human fibroblasts were treated under conditions which would be expected to lead to a negligible number of transformation events, i.e. cells labeled were in a non-growing environment and the dose of methylhydrazine (1.6 microgram/ml) was well below the ED50 value (62-100 microgram/ml), significant differences in DNA and protein methylation were observed. For both protein and DNA, 1,2-DMH produced a higher degree of methylation than 1,1-DMH, with MMH demonstrating the lowest level. The data suggests that in these cells there are significant differences in the metabolic and/or chemical transformation of the methylhydrazines in the proposed active metabolite, methyl diazonium ion. GRA

**N82-19834#** Naval Health Research Center, San Diego, Calif.
**NONAUDITORY EFFECTS OF HIGH INTENSITY NOISE ON GROUND CREWS AT A NAVAL AIR STATION Interim Report**
David J. Hord and M. A. Coultas 1981 19 p refs
(MF58524002)
(AD-A108996; NAVHLTHRSCHC-81-27) Avail: NTIS HC A02/MF A01 CSCL 06/19

Physiological, behavioral and subjective data were obtained from 14 ground crew considered possibly to be at risk for nonauditory effects of intense noise while working around jet aircraft. Fourteen matched control subjects working in normal noise environments were given the same test protocol. Brain stem evoked potentials, eye tracking behavior, balance, and nystagmus were compared between the groups and found to be nondiscriminating. In addition, subjective mood and perceived illness were compared and found to be the same in the two groups. It was concluded that ground crew wearing the required ear protection devices do not show nonauditory effects of intense noise encountered on their jobs, and that within the confines of the variables studied, no evidence exists that current safety measures and standards are inadequate. Author (GRA)

**N82-19835#** Tracor Jitco, Inc., Rockville, Md.
**ENVIRONMENTAL AND HEALTH ASPECTS OF ACRYLAMIDE: A COMPREHENSIVE BIBLIOGRAPHY OF PUBLISHED LITERATURE Final Report, 1950 - 1981**
Washington EPA Jun. 1981 83 p
(Contract EPA-68-01-5836)
(PB82-110123; EPA-560/7-81-006) Avail: NTIS HC A05/MF A01 CSCL 06I

The citations were selected from a thorough literature search, and broadly classified as having primarily environmental or biological emphasis. The sources used in the search are identified, and for the portion performed on line, the search strategies are also included. GRA

**N82-19836#** National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
**THE EFFECT OF VISUAL INFORMATION ON THE MANUAL APPROACH AND LANDING**
P. H. Wewerinke 16 May 1980 72 p refs
(Contract NIVR-1857)
(NLR-TR-80055-U) Avail: NTIS HC A04/MF A01

The effect of visual information combined with a basic display information on manual approach performance on the manual approach and landing task was studied. A pre-experimental, theoretical analysis in terms of the optimal control model for pilot/aircraft was performed, yielding approach performance predictions which could be compared with the experimental results of a moving base simulator program. The model provides a description of the visual perception process involved in the complex manual approach task, with predictive capability. The complex interaction of a variety of task variables is examined. Author (ESA)

**N82-19837*#** CAE Electronics Ltd., Montreal (Quebec).
**SIX DEGREE OF FREEDOM MANUAL CONTROLS STUDY REPORT Final Report**
G. M. McKinnon, A. Lippay, and M. L. King [1982] 65 p
(Contract NAS9-15939)
(NASA-CR-167532) Avail: NTIS HC A04/MF A01 CSCL 05H

The feasibility of using degree of freedom manual controls in space in an on orbit environment was determined. Several six degree of freedom controls were tested in a laboratory environment, and replica controls were used to control robot arms. The selection of six degrees of freedom as a design goal was based on the fact that six degrees are sufficient to define the location and orientation of a rigid body in space. S.L.

**N82-19838*#** SRI International Corp., Menlo Park, Calif.
**THE FEASIBILITY OF MINIATURIZING THE VERSATILE PORTABLE SPEECH PROSTHESIS: A MARKET SURVEY OF COMMERCIAL PRODUCTS**

Tracy Walklet Nov. 1981 207 p
(Contract NAS2-10143; SRI Proj. 8134)
(NASA-CR-168611) Avail: NTIS HC A10/MF A01 CSCL 05H

The feasibility of a miniature versatile portable speech prosthesis (VPSP) was analyzed and information on its potential users and on other similar devices was collected. The VPSP is a device that incorporates speech synthesis technology. The objective is to provide sufficient information to decide whether there is valuable technology to contribute to the miniaturization of the VPSP. The needs of potential users are identified, the development status of technologies similar or related to those used in the VPSP are evaluated. The VPSP, a computer based speech synthesis system fits on a wheelchair. The purpose was to produce a device that provides communication assistance in educational, vocational, and social situations to speech impaired individuals. It is expected that the VPSP can be a valuable aid for persons who are also motor impaired, which explains the placement of the system on a wheelchair. E.A.K.

**N82-19839#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.
**HUMAN FACTORS IN SYSTEM DEVELOPMENT: EXPERIENCES AND TRENDS**
Bengt Bergstroem, ed., Hans Furustig, ed., and Jeanette Palm, ed. Jun. 1981 156 p refs Proceedings of Symp., Karlstad, Sweden, 24-25 Sep. 1980
(FOA-A-56003-H9) Avail: NTIS HC A08/MF A01

The role of human factors engineering and research in present and future systems development is evaluated. Limitations on the man machine systems design process are pointed out. Status and effectiveness of human factors engineering are assessed. Ergonomic considerations in product design and evaluation are highlighted. Human factors and safety in nuclear power plant operation are discussed.

**N82-19840#** Research Inst. of National Defence, Karlstad (Sweden).
**HUMAN FACTORS AND THE REAL WORLD**
Bengt Bergstroem *In its* Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 7-13 refs

Avail: NTIS HC A08/MF A01

The integration of human factors in systems design and development is considered. The role of the ergonomist as an integral member of the design team is depicted. Real world limitations which sometimes prevent optimal systems from being realized are pointed out. These can be technical and economical, or political and legal constraints on design engineers. Limitations may also arise from the planning process or from scientific uncertainty as to the solvability of a problem. Common systems language and systems design criteria improve communication between specialists on the human side and on the hardware side. The identification of systems related tasks and functions has a direct influence on human performance in systems operation and determines their efficiency. Author (ESA)

**N82-19841#** Navy Personnel Research and Development Center, San Diego, Calif.
**HUMAN FACTORS IN SYSTEM DEVELOPMENT: STATUS AND EVALUATION**
David Meister *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 15-76 refs
Avail: NTIS HC A08/MF A01

Human factors in system development as it is presently performed in the U.S. is described. What is achieved and remaining problems are discussed, indicating research requirements and how human factors research does or does not satisfy these requirements. The way in which the developmental human factors engineer performs and the kinds of information needed are determined by circumstances under which the work is done. These circumstances make demands for supporting human factors research which to a large extent are not now being satisfied. As a consequence, the developmental human factors engineer's ability to perform system development tasks is severely impaired. Author (ESA)

**N82-19842#** Aktiebolaget Ergonomilaboratoriet, Stockholm (Sweden).
**ERGONOMIC CONSIDERATIONS IN PRODUCT DESIGN AND EVALUATION**
Toni Ivergaard *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 77-95
Avail: NTIS HC A08/MF A01

The influence of free market competition, particularly advertising and marketing constraints, on product development is assessed. The need for an ecological approach is stressed while an ergonomic design procedure is outlined. The marketing of products which are offered to consumers, including industrial users, is in some respects good and fulfils useful functions for the consumers. Still, there are many products which are potentially dangerous, unhealthy, uncomfortable, wearing or difficult to use. Ergonomics in product evaluation can help identify these problems. In many countries, the authorities feel obliged to control development in different ways. The extent and direction of these controls depends on the companies themselves investing in ergonomics as part of product development. Author (ESA)

**N82-19843#** Ergonomead A.B., Karlstad (Sweden).
**HUMAN FACTORS AND SAFETY IN NUCLEAR POWER PLANT OPERATION**
Jan Wirstad *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 97-122 refs
Avail: NTIS HC A08/MF A01

Taking the Three Mile Island accident as an example, the extent to which human factors engineering is accepted and implemented in nuclear power plant design and operation is discussed. Characteristics of process plant operator jobs are pointed out. The safety philosophy of a nuclear power plant is called into question. Human factors R and D in the U.S. and Europe are reviewed. The need to integrate human factors with plant planning, procurement and evaluation is evident. Author (ESA)

**N82-19844#** Research Inst. of National Defence, Karlstad (Sweden).
**WORK PARADIGMS IN HUMAN FACTORS RESEARCH**
Hans Furustig *In its* Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 123-135 refs

Avail: NTIS HC A08/MF A01

Reasons for studying the systems development process from a behavioral standpoint are put forward. The complexity of factors influencing systems development is examined. Indications of irrational systems development are listed. The work paradigm is defined in terms of hardware factors, personnel factors, and procedures. Means of studying systems development are outlined, i.e., participation in systems development, historical documentation, and simulation. The results of such studies can be of significant assistance in optimizing the efficiency of the development process. Author (ESA)

**N82-19845#** Navy Personnel Research and Development Center, San Diego, Calif.
**HUMAN FACTORS FOR THE FUTURE: TRENDS AND SPECULATIONS**
David Meister *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 137-155 refs
Avail: NTIS HC A08/MF A01

Two possible scenarios for human factors (HF) utilization in the next 20 years are projected. The worst case scenario is one of status quo; it suggests that no fundamental changes in HF research and practice will occur because of the continuing inability of the HF practitioner (the developmental human factors engineer) to apply research to systems development. The best case scenario assumes that the current gap between HF research and practice will be bridged and that consequently the developmental engineer's ability to analyze, evaluate and predict will be significantly increased. Author (ESA)

**N82-19846#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Computer Science.
**SAM: A CONFIGURABLE EXPERIMENTAL TEXT EDITOR FOR INVESTIGATING HUMAN FACTORS ISSUES IN TEXT PROCESSING AND UNDERSTANDING**
Roger W. Ehrich Sep. 1981 38 p
(Contract N00014-81-K-0143)

(AD-A109331; CSIE-81-3) Avail: NTIS HC A03/MF A01 CSCL 09/2

There are numerous behavioral issues involving human-machine communications that are exemplified by text editing applications. Examples include scanning mechanisms and information location techniques, command language design, effect of language syntax on productivity and accuracy, and the relationship of syntax to the user task model. In general, there exist little data to support design goals, and in order to formulate studies of these issues, a flexible text editing system is required. This report describes SAM, a reasonably sophisticated text editor that has table driven command language and syntax that allows reasonably easy reconfiguration for special experiments. In particular, it is straightforward to insert the metering procedures required to measure specific aspects of human performance.
Author (GRA)

**N82-19847#** Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

**TRANSMISSION OF SINUSOIDALLY CHANGING VERTICAL SPECIFIC FORCE TO THE HEADS OF SEATED MEN MEASURED IN A FLIGHT SIMULATOR**

R. A. A. Reutlinger and J. C. vanderVaart May 1981 34 p refs

(VTH-LR-319) Avail: NTIS HC A03/MF A01

Modulus and phase lag of the transmission of vertical specific force between a flight simulator moving base and the heads of 10 male seated subjects were measured over a frequency range of 0.1 to 9 Hz. Subjects were seated unrestrained in a normal relaxed position in a pilot seat with or without seat cushions. Although there is scatter among subjects, prominent peaks at around 1.5, 6, and 10 Hz are found for the case without seat cushions. The presence of seat cushions tends to cause a single larger peak in the modulus at around 4 to 5 Hz, and a larger phase lag at higher frequencies. A modulus close to unity and no phase lag are found both with and without seat cushions at frequencies below 1 Hz. It is difficult to read cockpit instruments in the frequency range 4 to 8 Hz.
Author (ESA)

**N82-19848#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Instrumentierung und Anthropotechnik.

**INTERACTIONS BETWEEN HELMET MOUNTED SIGHT DISPLAY AND SENSOR PLATFORM UNDER THE INFLUENCE OF A HUMAN PILOT**

Erhard Danneberg, Ernst Kohnen, Helmut Stein, and Ulrich Stolzke Jun. 1981 182 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-746)

(DFVLR-FB-81-30) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 37.90

For low altitude flight of helicopters at night and with poor visibility, the interaction of a helmet mounted sight display (HMS/D), a moving sensor platform and a human pilot as system user was investigated by means of laboratory, moving simulator, and flight tests. The technical potential of the HMS/D in the laboratory, the tracking accuracy achieved by the pilot on the moving simulator, and the practical application under real flight conditions are considered. Considerable improvements are possible compared to head down displays if the layout of the instrument readings and their combination with an environmental picture are favorable.
Author (ESA)

Tracy Walklet Nov. 1981 207 p
(Contract NAS2-10143; DRI Proj. 5134)
(NASA-CR-166311) Avail: NTIS HC A10/MF A01 CSCL 06B

The feasibility of a miniature variable phoneme speech prosthesis (VPSP) was analyzed and information on its potential users and on other similar devices was collected. The VPSP is a device that incorporates speech synthesis technology. The objective is to provide sufficient information to decide whether there is valuable technology to contribute to the miniaturization of the VPSP. The needs of potential users are identified, the development status of technologies similar or related to those used in the VPSP are evaluated. The VPSP, a computer based speech synthesis system fits on a wheelchair. The purpose was to produce a device that provides communication assistance in educational, vocational, and social situations to speech impaired individuals. It is expected that the VPSP can be a valuable aid for persons who are also motor impaired, which explains the placement of the system on a wheelchair. E.A.K.

**N82-19839#** Research Inst. of National Defense, Stockholm (Sweden). Huvudavdelning 5.
**HUMAN FACTORS IN SYSTEM DEVELOPMENT: EXPERIENCES AND TRENDS**
Bengt Bergstroem, ed., Hans Forsberg, ed., and Jeanette Palm, ed. Jun. 1981 198 p refs Proceedings of Symp., Karlstad, Sweden, 24-25 Sep. 1980
(FOA-C-56002-H9) Avail: NTIS HC A09/MF A01

The role of human factors engineering and research in present and future systems development is evaluated. Limitations on the man machine systems design process are pointed out. Status and effectiveness of human factors engineering are assessed. Ergonomic considerations in product design and evaluation are highlighted. Human factors and safety in nuclear power plant operation are discussed.

**N82-19840#** Research Inst. of National Defense, Karlstad (Sweden).
**HUMAN FACTORS AND THE REAL WORLD**
Bengt Bergstroem *In its* Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 7-15 refs

Avail: NTIS HC A09/MF A01

The integration of human factors in systems design and development is considered. The role of the engineer as an integral member of the design team is depicted. Real world limitations which sometimes prevent optimal systems from being realized are pointed out. There can be technical and economical, or political and legal constraints on design engineers. Limitations may also arise from the planning process or from scientific uncertainty as to the solvability of a problem. Common systems language and systems design criteria improve communications between specialists on the human side and on the hardware side. The distribution of systems related tasks and functions has a direct influence on human performance in systems operation and determines their efficiency. Author (ESA)

**N82-19841#** Navy Personnel Research and Development Center, San Diego, Calif.
**HUMAN FACTORS IN SYSTEM DEVELOPMENT: STATUS AND EVALUATION**
David Meister *In* Research Inst. of National Defense Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 16-26 refs
Avail: NTIS HC A09/MF A01

Human factors in system development as it is currently performed in the U.S. is described. What is achieved and remaining problems are discussed, including research requirements and how human factors research does or does not satisfy those requirements. The way in which the developmental human factors engineer performs and the kinds of information needed are determined by the influences under which the work is done. These organizational make demands for supporting human factors research which to a large extent are not now being satisfied. As a consequence, the developmental human factors engineer's ability to perform system development tasks is severely impaired. Author (ESA)

**N82-19842#** Miljöbolaget Ergonomilaboratoriet, Stockholm (Sweden).

**ERGONOMIC CONSIDERATIONS IN PRODUCT DESIGN AND EVALUATION**
[illegible] *In* Research Inst. of National Defense [illegible]

[illegible] in different ways. The extent and direction of their [illegible] depends on the [illegible]

**WORK PARADIGMS IN HUMAN FACTORS RESEARCH**
Hans Forsberg *In its* Human Factors in System Develop.: [illegible]

[illegible] Avail: NTIS HC A09/MF A01

Two possible scenarios for human factors (HF) utilization in the next 20 years are projected. The worst-case scenario is the status quo. It suggests that no fundamental changes in research and practice will occur because of the continuing inability of the HF practitioner (the developmental human factors engineer) to apply research to systems development. The best case scenario assumes that the current gap between HF research and practice will be bridged and that consequently the developmental engineer's ability to analyze, evaluate and predict will be significantly increased. Author (ESA)

**N82-19844#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Computer Science.
**SAM: A CONFIGURABLE EXPERIMENTAL TEXT EDITOR FOR INVESTIGATING HUMAN FACTORS ISSUES IN TEXT PROCESSING AND UNDERSTANDING**
Roger W. Ehrich Sep. 1981 38 p
(Contract N00014-81-K-0143)

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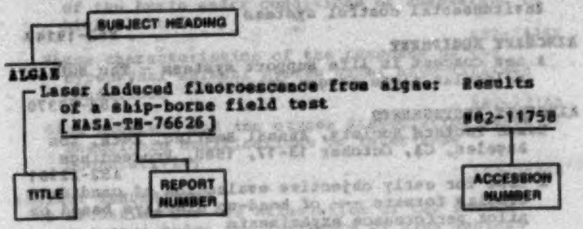

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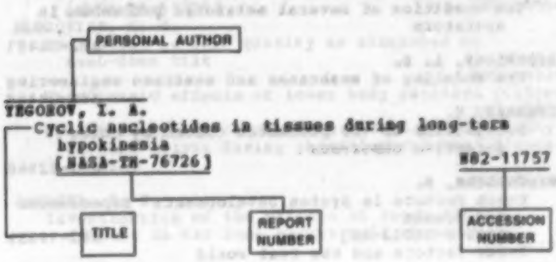

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 234)

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in June 1982 in**

- *Scientific and Technical Aerospace Reports (STAR)*
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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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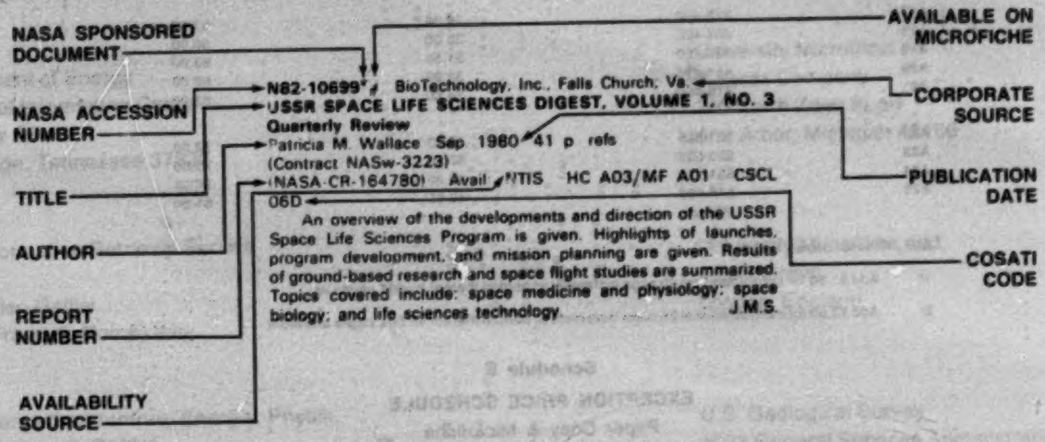

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N82-10699*# BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3**
**Quarterly Review**
Patricia M. Wallace Sep 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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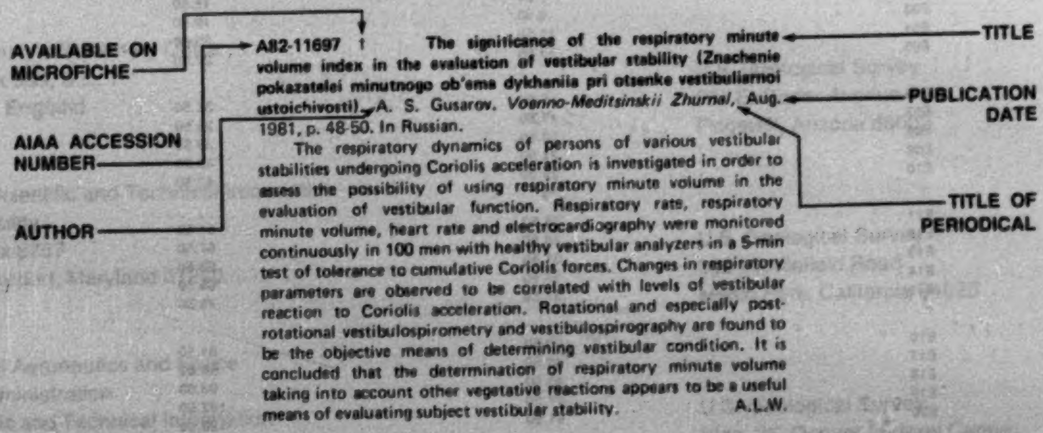

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The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

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JULY 1982

## IAA ENTRIES

**A82-25619** **Final-position of a single degree-of-freedom tendon arm.** P. R. H. Riemenschneider, T. L. Johnson (Bolt Beranek and Newman, Inc., Cambridge, MA), and K. H. Chen (MIT, Cambridge, MA). In: Conference on Decision and Control, 19th, and Symposium on Adaptive Processes, Albuquerque, NM, December 10-12, 1980, Proceedings. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1980, p. 1070-1075. 5 refs. Research supported by the Whitaker Health Sciences Fund.

A decentralized controller for a mechanical analog of human biceps/triceps control of forearm movement has been designed and tested. The analysis, design, and implementation of this system should be of interest not only as a control application, but also because it brings out some important features which are generic to the positioning of tendon arms of all types. Most particularly, a crude but effective form of load compensation is shown to be possible without (the equivalent of) proprioceptive feedback; this supports recent physiological findings which suggest that large arm movements in primates may be predominantly open-loop processes of final position control. (Author)

**A82-25632** * **Control system analysis and synthesis for a six degree-of-freedom universal Force-Reflecting Hand Controller.** M. Handlykken and T. Turner (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). In: Conference on Decision and Control, 19th, and Symposium on Adaptive Processes, Albuquerque, NM, December 10-12, 1980, Proceedings. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1980, p. 1197-1205. 13 refs. Contract No. NAS7-100.

A six degree-of-freedom joystick with feedback motors, called the Force-Reflecting Hand Controller (FRHC) is used as control input for the human operator in a teleoperator system. The geometric and dynamic properties of the FRHC are entirely different from those of the manipulator being controlled. The paper discusses the analysis and synthesis of the control loop between the FRHC and the robot arm and examines the necessary position and force transformations. The controller is implemented through a dedicated minicomputer. (Author)

**A82-25647** **Corrective saccades - Effect of shifting the saccade goal.** H. Deubel, W. Wolf, and G. Hauske (München, Technische Universität, Munich, West Germany). *Vision Research,* vol. 22, no. 3, 1982, p. 353-364. 32 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-50.

A double step paradigm was used to investigate the saccade control, in particular the role of retinal feedback on correction saccades. The first target step eliciting the primary saccade had an amplitude of 10-15 deg and was followed by a second target step of 3 deg which occurred 0-300 msec after the onset of the primary saccade. The characteristics of the saccadic reactions were analyzed as a function of the time between the end of the primary saccade and the second target step. The data show that correction saccades can be modified when the second target step occurs earlier than 80 msec after the end of the primary saccade. Secondary saccades then are corrective, and their parameters show no differentiation between endogenous and exogenous refixation errors. In further experiments, additional blanking periods were inserted separating the visual system from reafferent information. Under this condition, the system is silent and starts the programming of the correction saccade only when the target is illuminated again. The data demonstrate that retinal feedback is a fundamental part in refixation. (Author)

**A82-25648** **Perceived rate of movement depends on contrast.** P. Thompson (Cambridge University, Cambridge, England). *Vision Research,* vol. 22, no. 3, 1982, p. 377-380. 9 refs. Science Research Council Grant No. GR/A/73817.

The results of experiments which examined the appearance of moving gratings above threshold are reported. Moving sine wave gratings were generated on contiguous oscilloscopes and subjects varied the rate of the right hand screen to match the rate of movement of the left. Test grating contrasts were varied in 0.15 log time steps and the base pattern was displayed for only 2.5 sec/trial, followed by a 17.5 sec lapse. A changeover from under- to overestimation was observed at 8 Hz, and not at a constant velocity. A second experiment with varying rates of movement, contrast levels, and a left-eye display for comparison with a previous standard of movement was used for the contrast effects determination. The results closely matched the first experiment, and a two-channel model is proposed which features a slow channel sensitive to slow-moving patterns, and a fast channel for fast moving patterns, with different contrast sensitivities in each channel. M.S.K.

**A82-25649** **Intraretinal recordings of slow electrical responses to steady illumination in monkey - Isolation of receptor responses and the origin of the light peak.** J. M. Valeton and D. van Norren (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Soesterberg, Netherlands). *Vision Research,* no. 3, 1982, p. 393-399. 32 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

**A82-25676** † **Basic principles of hypoxia control during shock (Osnovnye printsipy bor'by s gipoksiei pri shoke).** V. K. Kulagin and I. G. Boldina. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 10-15. 47 refs. In Russian.

Principles governing the treatment of hypoxia encountered during episodes of shock are discussed. General mechanisms of the development of hypoxia during various types of shock are reviewed, including an elevation in sympathetic nervous system tonus and increase in catecholamine production, centralization of blood flow, blood loss, pulmonary disturbances leading to arterial hypoxemia, cellular damage limiting oxygen utilization and toxemia. The necessity of a combined approach to shock, treating pain, respiration, cardiovascular activity, tissue respiration, and metabolism, is emphasized, and it is noted that any treatment for shock will eventually affect shock-induced hypoxia. Particular attention is then given to various classes of antihypoxants used in the treatment of shock on the cellular and subcellular levels, including glucose, phosphorylated hydrocarbons, ATP and its dephosphorylation products, amino acids, Krebs cycle intermediates, electron acceptors and their constituents, vitamin B1, succinic acid, and thiourea derivatives. A.L.W.

**A82-25677** † **Expansion of the experimental possibilities of evaluating cardiac output by means of integral rheography using a**

**high-pass filter (Rasshirenie v eksperimente vozmozhnostei otsenki serdechnogo vybrosa metodom integral'noi reografii putem primeneniia fil'tra vysokikh chastot).** M. A. Vizel' (Azerbaidzhanskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Professional'nykh Zabolevanii, Baku, Azerbaidzhan SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* May-June 1981, p. 64, 65. 6 refs. In Russian.

**A82-25678 †** **Dynamics of brain cell oxygen tension and electrical activity in the norm and in hypoxia (Dinamika napriazheniia kisloroda i elektricheskoi aktivnosti kletok mozga v norme i pri gipoksii).** M. T. Shaov (Kabardino-Balkarskii Gosudarstvennyi Universitet, Nalchik, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 22-26. 12 refs. In Russian.

Changes in oxygen levels and electrical activity in brain cells under normal conditions, conditions of acute hypoxia and following the development of hypoxia adaptation are investigated in a study of cellular adaptation mechanisms. Microelectrodes placed against the membranes of single cells in the rat motor cortex were used to measure both oxygen tension and electrical impulses in rats kept under laboratory conditions and periodically exposed to a simulated altitude of 7 km. Oxygen tensions at the cellular membrane are observed to be significantly greater in hypoxia-adapted than control animals under normal conditions and to remain higher, although by a lesser margin, at simulated altitudes as high as 12 km, although absolute levels in both groups decreased with increasing hypoxia. The formation of the oxygen gradient in adapted animals is related to a reduction in cellular oxygen consumption, which is reflected in differential reductions in electrical activity. A.L.W.

**A82-25679 †** **Elevation of hypoxia tolerance under the influence of prolonged fasting (Povyshenie ustoichivosti organizma k gipoksii pod vliianiem dlitel'nogo golodaniia).** Iu. V. Zinov'ev, E. Iu. Podgornaia, and A. G. Kardovskii (Kirovskii Nauchno-Issledovatel'skii Institut Perelivaniia Krovi, Kirov, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 63-65. 12 refs. In Russian.

The use of fasting as a measure to increase hypoxia tolerance is investigated in rabbits undergoing altitude hypoxia, hemorrhagic hypotension, and circulatory hypoxia. Fasting for a period of two weeks is observed to increase the survival rate for exposure to 10,000 m simulated altitude for 1 hour from 10% for control animals and 20% for animals treated with gutamine, to 100%. Observations of hyperglycemia and a less intense antihypoxic effect in circulatory hypoxia due to hepatic-duodenal ligament compression suggest enhanced gluconeogenesis in the liver and kidneys to be the predominant mechanism accounting for increased hypoxia tolerance in fasted animals. A.L.W.

**A82-25680 †** **The energy supply of serotonin inactivation processes in the lungs (Energoobespechenie protsessov inaktivatsii serotonina v legkikh).** P. V. Dubilei (Volgogradskii Institut Fizkul'tury, Volgograd, USSR) and V. V. Teniukov (Chuvashskii Gosudarstvennyi Universitet, Cheboksary, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 69-73. 11 refs. In Russian.

The nature of the energy supply to the energy-dependent tissue absorption process in the pulmonary inactivation of serotonin (5-HT) is investigated in a series of oxygen deprivation experiments, serving to suppress aerobic metabolism. Measurements of arterial, venous and pulmonary serotonin levels were made in dogs, cats and isolated perfused rat lungs under conditions of occlusional, hypoxic and anoxic hypoxia. Acute hypoxia is observed to lead to an impairment in pulmonary 5-HT inactivation as revealed by the increase in total and free 5-HT levels in arterial and venous blood. The transition from hypoxia to breathing of normal air reverses these changes, and increases the veno-arterial 5-HT gradient to a level twice the initial. Data indicate the importance of aerobic metabolism in the energy supply for 5-HT absorption, a hypothesis supported by observations of increases in glycolytic enzyme activities and lactate production during hypoxia. A.L.W.

**A82-25681 †** **The effectiveness of various radio-protective agents in protecting the germ cells of male mice against the genetic effects of radiation. II - The incidence of reciprocal translocations in irradiated spermatogonia (Effektivnost' primeneniia razlichnykh radioprotektorov dlia zashchity polovykh kletok samtsov myshei ot geneticheskogo deistviia radiatsii. II - Izuchenie chastoty retsiproknykh translokatsii v spermatogoniiakh).** M. D. Pomerantseva, L. K. Ramaiia, G. A. Vilkina, P. G. Zherebchenko, and G. V. Kalistratov (Akademiia Nauk SSSR, Institut Obshchei Genetiki; Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR). *Radiobiologiia,* vol. 21, Nov.-Dec. 1981, p. 841-846. 19 refs. In Russian.

**A82-25682 †** **The indication of radiation resistance modified by radio-protective agents. III - Analysis of the relationship between hypoxic and radio-protective effects in the rat bone marrow for hypoxias of different origin (Voprosy indikatsii modifitsirovannoi protektorami radiorezistentnosti. III - Analiz sviazi gipoksicheskogo i radiozashchitnogo effektov v kostnom mozge krys v usloviiakh gipoksii razlichnogo geneza).** L. M. Rozhdestvenskii. *Radiobiologiia,* vol. 21, Nov.-Dec. 1981, p. 847-853. 18 refs. In Russian.

**A82-25683 †** **Potentiation of the protective effect of sulfur-containing radioprotectors (Potentsirovanie zashchitnogo deistviia u serosoderzhashchikh radioprotektorov).** V. G. Vladimirov, T. G. Zaitseva, and S. M. Smirnova. *Radiobiologiia,* vol. 21, Nov.-Dec. 1981, p. 836-840. 10 refs. In Russian.

The potentiation of the radiation-protective effects of cystamine and aminopropylaminoethylthiophosphoric acid (APAETP) by their simultaneous use with certain thiourea derivatives is investigated. Each sulfur-containing radioprotective agent was administered in combination with the hypertensives ethyron or methyron or the antioxidant gutimine to mice 20 min before exposure to a gamma-ray dose of 7.5 g-r. Evaluation of 30-day survival rates and spleen and bone marrow cell populations reveals the thiourea derivatives to be effective in increasing the radioprotective actions of cystamine and APAETP, particularly when ethyron and gutimine are used. The two-component mixtures are also found to reduce the toxicity of the radioprotectors, thus widening the radioprotective zone and increasing the safety index. A.L.W.

**A82-25684 †** **The therapeutic application of heterologous serum globulin against the acute radiation sickness of mice (Lechebnoe primenenie geterologichnogo syvorotochnogo globulina pri ostroi luchevoi bolezni myshei).** N. N. Dobronravova, T. D. Kuz'mina, A. M. Ulanova, A. P. Nevinnaia, G. A. Shal'nova, and I. A. Gol'tsev. *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 595-598. 7 refs. In Russian.

**A82-25685 †** **The influence of the seasonal factor and the intensity of work on the basic physiological functions of agricultural workers (Vliianie sezonnosti i napriazhennosti trudovogo protsessa na osnovnye funktsii organizma rabotnikov sel'skokhoziaistvennogo proizvodstva).** A. O. Navakatikian, G. G. Lysina, L. N. Rossinskaia, and L. S. Osinskaia (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Laboratoriia Funktsional'noi Diagnostiki, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* July 1981, p. 100-103. 9 refs. In Russian.

**A82-25686 †** **Main trends in combatting oxygen hunger (Osnovnye napravleniia bor'by s kislorodnym golodaniem).** V. A. Berezovskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* July 1981, p. 64-67. 19 refs. In Russian.

The system used in classifying hypoxic conditions is described. A description is also given of the two forms of oxygen therapy, which is one of the most common means of treating hypoxia. In the first, the partial pressure of oxygen is increased without raising the overall pressure; this is done by increasing the concentration of oxygen. In the second form of oxygen therapy, oxygen at a higher pressure is introduced in compression chambers. In many cases, however, oxygen therapy is ineffective because of an intolerance to oxygen. There are two approaches in treating any form of oxygen hunger. One is replacement therapy. The other involves vaccinations (in the case of infectious diseases) and the gradual acclimatization to and use of mountain climates (for many illnesses related to chronic hypoxic conditions). The overall therapeutic effect of mountain climates is discussed. C.R.

**A82-25687 † Reception of retinal in rat retinas - Various molecular forms (Retseptsiia retinola v setchatke krys - Razlichnye molekuliarnye formy).** B. V. Pokrovskii, M. E. Shabanova, and B. I. Mitsner (Akademiia Meditsinskikh Nauk SSSR; Institut Tonkoi Khimicheskoi Tekhnologii, Moscow, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, May-June 1981, p. 392-397. 19 refs. In Russian.

**A82-25688 † Expenditure of energy and the state of the neuromuscular system in athletes who use low-calorie diets to control their weight (Energotraty i funktsional'noe sostoianie nervno-myshechnoi sistemy sportsmenov v usloviiakh regulirovaniia massy tela s pomoshch'iu gipokaloriinoi diety).** V. I. Shubin, K. A. Laricheva, N. I. Ialovaia, N. M. Lobas, and T. M. Shamarina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Pitaniia,* Jan.-Feb. 1981, p. 11-15. 9 refs. In Russian.

**A82-25689 † Vestibular dysfunctions in caisson workers subjected to a combination of occupational hazards (Vestibuliarnaia disfunktsiia u rabochikh-kessonshchikov, podvergavshikhsia vozdeistviiu kombinirovannykh proizvodstvennykh vrednostei).** R. M. Rzaev (Azerbaidzhanskii Meditsinskii Institut, Baku, Azerbaidzhan SSR). *Vestnik Otorinolaringologii,* Jan.-Feb. 1982, p. 20-23. 7 refs. In Russian.

**A82-25690 † A bicycle-ergometer evaluation of the physical adjustment made by patients after an inner mitral commissurotomy (Veloergometricheskaia otsenka fizicheskoi adaptatsii bol'nykh posle zakrytoi mitral'noi komissurotomii).** K. I. Danilova (Karagandinskoe Mezhoblastnoe Otdelenie Serdechnoi Khirurgii, Karaganda, Kazakh SSR). *Kardiologiia,* vol. 21, Feb. 1981, p. 105, 106. 8 refs. In Russian.

**A82-25691 † Comments on the theory for the accuracy of rapid motor acts of Schmidt et al. (Zamechaniia k trorii tochnosti bystrykh dvizhenii, predlozhennoi R. Shmidtom s soavtorami).** I. E. Tsibulevskii (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Voprosy Psikhologii,* May-June 1981, p. 127-131, 191. In Russian.

Attention is given to the theory of Schmidt et al. (1979) concerning the accuracy of rapid motor acts relating to motor-output variability. A description of the theory is given and some critical comments are made. Schmidt's theory is reduced to the proposition that when path and time are given the rapid motor acts are divided into two classes: targeted and nontargeted. It is argued that the nontargeted motor acts accord with the theory of open programmed control, while targeted acts cannot be explained by this theory. B.J.

**A82-25692 † Population mechanisms of adapting to extreme environmental conditions /with Clethrionomys glareolus Schreb considered as an example/ (Populiatsionnye mekhanizmy prisposoblenii k ekstremal'nym usloviiam sredy /na primere ryzhei polevki/).** G. V. Olenev (Akademiia Nauk SSSR, Institut Ekologii Rastenii i Zhivotnykh, Sverdlovsk, USSR). *Zhurnal Obshchei Biologii,* vol. 42, July-Aug. 1981, p. 506-511. 21 refs. In Russian.

**A82-25693 † The nature of autonomic effects produced by sombrevin (O prirode vegetativnykh effektov sombrevina).** N. A. Osipova, O. N. Zagrebal'nyi, and V. A. Svetlov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 1, 1981, p. 76-82. 40 refs. In Russian.

Clinical-electrophysiological studies involving the continuous synchronous recording of EEG, EKG, pneumograms, and galvanic skin response have been performed in order to investigate the stimulation mechanisms of respiratory and cardiac activity by sombrevin. It is found that the onset of sombrevin-induced autonomic crisis is preceded by the development of narcosis and is associated with increases in brain electric activity and with hypersynchronization of EEG rhythms. This onset may therefore be considered as a manifestation of an excitation phase. Phentanyl prevents the autonomic crisis, the antagonism of the drugs presumably effected at the hypothalamic level. B.J.

**A82-25694 † A psychophysiological analysis of the memory changes undergone by humans in adapting to new climatic and geographic conditions (Psikhofiziologicheskii analiz izmenenii pamiati cheloveka v protsesse adaptatsii k novym klimatogeograficheskim usloviiam).** E. I. Nikolaeva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 5, 1981, p. 68-71. 11 refs. In Russian.

**A82-25695 † Connection of motor regimen with morbidity in workers (Vzaimosviaz' osobennostei dvigatel'nogo rezhima s zabolevaemost'iu u trudiashchikhsia).** L. N. Nifontova and I. S. Bievetskaia (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 38-41. 15 refs. In Russian.

The dependence of worker morbidity on the duration, time distribution and intensity of physical exercise performed by them in the course of a week is investigated. Comparison of responses to a physical exercise questionnaire with the morbidity histories of automotive workers reveals the optimal level of exercise with respect to illness and injury incidence to be between 2 and 6 hours/week in the various age-sex groups. For persons under 30 years of age, the most beneficial regimen consists of exercise more than six times a week, while for those 30 and over exercise is most beneficial when taken two to three times a week. The least morbidity in all classes is observed in workers expending 4000-5000 kcal a week in physical exercise. Results are in accordance with previous studies, supporting the existence of definite motor activity norms for maintaining productivity and health. A.L.W.

**A82-25696 † Dynamics of aerobic work capacity and changes in the functional stability of the oxygen-supply mechanism and hypophysical adrenocortical system in skiers (Dinamika aerobnoi rabotosposobnosti i izmenenie funktsional'noi ustoichivosti mekhanizma snabzheniia organizma kislorodom i gipofizarno-adrenokortikal'noi sistemy u lyzhnikov-gonshchikov).** T. A. Matsin, Kh. V. Kinks, and A. A. Viru (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 23-25. 6 refs. In Russian.

**A82-25697 † Clinical characteristics of neurotic disorders in female long-distance telephone operators (Klinicheskaia kharakteristika nevroticheskikh rasstroistv u telefonistok mezhdugorodnikh stantsii).** Iu. M. Nevskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Feb. 1981, p. 30-32. In Russian.

**A82-25698 † The importance of pauses during work with vibrating tools (Znachenie pauz pri rabote s vibroopasnymi instrumentami).** Z. M. Butkovskaia (Institut Gigieny Truda i Profzabolevanii, Leningrad, USSR), R. I. Dol'nik (Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR), and A. F. Safonova (Sanepidstantsiia, Leningrad, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Oct. 1981, p. 40-43. In Russian.

A study is made of the activity of workers in the shipbuilding industry who use heavy vibrating tools. The amount of time during a shift that each worker spends actually operating the tool is determined. Although a sufficient number of the intervals between operation are at least 2 min, the distribution of these pauses is found to be uneven. Measures are proposed to correct this imbalance. C.R.

**A82-25699 † The effectiveness of vibration damping at the working positions on open-pit excavators at the Kursk magnetic anomaly (Effektivnost' vibroamortizatsii rabochikh mest na kar'ernykh ekskavatorakh Kurskoi magnitnoi anomalii).** Iu. P. Syromiatnikov, N. K. Kornilov, L. T. Kozakova, and A. I. Neplokhov (Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 35-37. 6 refs. In Russian.

**A82-25700 † Physiological and hygienic characteristics of the work of open-hearth steel smelters (Fiziologo-gigienicheskaia kharakteristika truda staleplavil'shchikov v usloviiakh martenovskogo proizvodstva).** E. N. Belitskaia (Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 9-11. 9 refs. In Russian.

**A82-25701 † Physiological effects of low levels of vibration combined with local muscular exercise in the cutting of semiprecious**

**stones (Vliianie na organizm 'malykh' urovnei vibratsii v sochetanii s lokal'noi myshechnoi nagruzkoi pri ogranke poludragotsennykh kamnei).** L. Ia. Tarkovskaia, B. S. Salganikova, and E. E. Troitskaia (Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 38-41. In Russian.

**A82-25702** † **Basis for the refinement of permissible levels of local vibration (K voprosu ob obosnovanii utochneniia dopustimykh urovnei lokal'noi vibratsii).** G. A. Suvorov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), Z. M. Butkovskaia (Institut Gigieny Truda i Profzabolevanii, Leningrad, USSR), and A. M. Mikulinskii (Institut Gigieny Truda i Profzabolevanii, Gorki, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 12-15. 10 refs. In Russian.

Experimental and clinical data is presented which supports a revision of standards in the Soviet Union for maximum local vibration exposure. Studies on bulls have shown the sensitivity thresholds to vibration at 125 and 500 Hz to differ by 10-15 dB, necessitating an upward revision of limiting vibration levels at frequencies of 16 Hz or less with respect to that at 125 Hz. Examinations of workers using high- and low-frequency hand-held machines have further allowed the determination of absolute vibration levels at various frequencies at which no significant physiological impairments are observed. Results are noted to converge with those of previous investigators identifying vibrations with maximum intensity in the octave band centered at 125 Hz as the most dangerous. A.L.W.

**A82-25703** † **Evaluation of certain indices used in experimental and field conditions to detect the effects of noise (Otsenka nekotorykh pokazatelei, primenimykh v eksperimental'nykh i proizvodstvennykh usloviiakh dlia ustanovleniia shumovogo vozdeistviia).** L. Tsaneva, Ia. Moskov, and S. Dipchikova (Meditsinska Akademiia, Sofia, Bulgaria). *Gigiena Truda i Professional'nye Zabolevaniia,* Oct. 1981, p. 31-34. 6 refs. In Russian.

The cardiovascular function, the perception and processing of visual information, and disturbances in visual and motor coordination are considered as indices of the effects of noise. Noise exposure was found to produce a change in the parameters of information processing, and to reduce the tempo and quality of work. Changes in the visual analyzer function are manifested in an increase in the threshold of the electric sensitivity of the eye and in the reduction of visual acuity. Changes in the visual and motor coordination parameters are manifested in the increase in the time necessary to solve prescribed problems and in the increased number of errors. B.J.

**A82-25704** † **Coagulopathy in miners with vibration sickness (Koagulopatiia u gorniakov, bol'nykh vibratsionnoi bolezn'iu).** I. Pramatarov and G. Batinova (Meditsinska Akademiia, Pleven, Bulgaria). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 48-50. 6 refs. In Russian.

**A82-25705** † **Some characteristics of cardiovascular system activity and adaptive antihypoxic mechanisms in keyboard computer operators during the course of a work shift (Nekotorye osobennosti funktsional'noi aktivnosti serdechno-sosudistoi sistemy i prisposobitel'nykh antigipoksicheskikh mekhanizmov u operatorov klavishnykh elektronno-vychislitel'nykh mashin v dinamike rabochei smeny).** A. A. Kononenko and V. V. Derkach (Institut Gigieny Truda i Profzabolevanii, Kharkov, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 29-32. 11 refs. In Russian.

**A82-25706** † **Effects of high ambient temperature on athlete adaptation to muscular activity (Vliianie vysokoi vneshnei temperatury na adaptatsiiu organizma sportsmena k myshechnoi deiatel'nosti).** K. M. Akhundov and M. K. Rips (Azerbaidzhanskii Gosudartsvennyi Meditsinskii Institut, Baku, Azerbaidzhan SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 25-27. 17 refs. In Russian.

**A82-25707** † **Clinical and epidemiologic analysis of ischemic EKG responses to physical exercise in males (Kliniko-epidemiologicheskii analiz iskhemicheskikh reaktsii EKG na fizicheskuiu nagruzku u muzhchin).** B. M. Lipovetskii, V. S. Konstantinov, and G. N. Il'ina (Akademiia Medinskikh Nauk SSSR, Leningrad, USSR). *Sovetskaia Meditsina,* no. 4, 1981, p. 10-13. 13 refs. In Russian.

A differential analysis is presented of the responses to physical exercise of males aged 40-59 in the presence or absence of accompanying stenocardia. Subjects were selected from a baseline population of 3907 persons residing in a single urban administrative district who had undergone preliminary cardiac screening. Exercise electrocardiograms performed on a bicycle ergometer or treadmill resulted in an ischemic response in 7.7% of healthy subjects selected randomly from the population, 55.0% of those selected with effort stenocardia, and 10.7% of those selected with hyperlipidemia. Three types of ischemic response are distinguished: isolated EKG ST segment depression, anginal pain without accompanying EKG changes, and a combination of anginal pain with ST segment depression. It is concluded that the ischemic response to physical exercise is related primarily to the degree of coronary insufficiency and the level of arterial pressure. A.L.W.

**A82-25708** † **Determination of the bacterial endotoxin content of the blood of irradiated animals and humans (Opredelenie soderzhaniia bakterial'nykh endotoksinov v krovi zhivotnykh i liudei, podvergnutykh oblucheniiu).** P. N. Kiselev and T. S. Shchul's (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgenoradiologicheskii Institut, Leningrad, USSR). *Laboratornoe Delo,* no. 9, 1981, p. 561-563. 10 refs. In Russian.

The use of actinomycin D to increase organism sensitivity to bacterial lipopolysaccharides thereby allowing the detection of bacterial endotoxins is investigated in mice injected with blood components from irradiated animals. The mice were administered doses of the blood preparations in the amount of 1000 microgram/mouse simultaneously with 10 micrograms of actinomycin D, which amount had been found to increase mouse sensitivity to bacterial endotoxins by a factor of 1500. By this method it is found that the development of endotoxemia in mice irradiated at doses of 3 and 7 g-r has a three-phase character, and that endotoxemia is present in humans at levels from 0.0806 to 0.9166 microgram/ml during therapeutic radiation treatments of the adominal cavity. A.L.W.

**A82-25709** † **Evaluation of the antioxidant system of the body (Otsenka antioksidantnoi sistemy organizma).** N. K. Rudakova-Shilina and N. P. Matiukhova (Volgogradskii Meditsinskii Institut, Volgograd, USSR). *Laboratornoe Delo,* no. 1, 1982, p. 19-22. 20 refs. In Russian.

Vitamin E content in the blood plasma lipids was examined along with reduced glutathione levels in the blood of donors aged 20 to 40. It was found that the content of vitamin E in the body had a tendency to decrease with age, and that the reduced glutathione levels did not vary significantly in the group examined. B.J.

**A82-25710** † **Impairment of orthostatic posture regulation in boxers following closed craniocerebral injury (Narusheniia reguliatsii ortostaticheskoi posy posle zakrytoi cherepno-mozgovoi travmy u bokserov).** R. Z. Kravets and V. M. Sirotkin (Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Kazanskii Meditsinskii Zhurnal,* vol. 62, Nov.-Dec. 1981, p. 22-24. In Russian.

**A82-25711** † **Effect of white noise on the auditory cortex ultrastructure in rats (Vliianie belogo shuma na ul'trastrukturu slukhovoi kory krys).** N. I. Artiukhina, O. F. Kuvaeva, and I. P. Levshina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Apr. 1981, p. 495-498. 15 refs. In Russian.

**A82-25712** † **Response of the cat femoral artery to increased circulation rate (Reaktsii bedrennoi arterii koshek na uvelichenie skorosti krovotoka).** A. M. Mel'kumiants, E. S. Veselova, and V. M. Khaiutin (Akademiia Meditsins'kikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Aug. 1981, p. 7-9. 12 refs. In Russian.

**A82-25713** † **The significance of chemoreceptor stimuli for the rate of switch-on and switch-off of the respiratory response to**

**physical exercise (Znachenie khemoretseptornykh stimulov dlia skorosti vkliucheniia i vykliucheniia reaktsii dykhaniia na myshechnuiu rabotu).** I. S. Breslav, G. G. Isaev, and A. M. Shmeleva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, May 1981, p. 522-525. 6 refs. In Russian.

The magnitude of the respiratory response to physical exercise and its switch-on and switch-off rates were investigated in 12 healthy men breathing different gas mixtures. It is shown that a hypercapnic stimulus reinforced and accelerated the respiratory response to exercise. In addition, it was found that a hypoxic stimulus resulted primarily in increased though transient changes in the ventilation rate at the beginning and the end of the exercise. This effect appears likely to be mediated by fast-responding arterial chemoreceptors. B.J.

**A82-25714 † Investigation of the mechanism of auditory adaptation by the simultaneous recording of auditory evoked potentials of the brain and neurotropic potentials of the cochlea (Izuchenie mekhanizma slukhovoi adaptatsii s pomoshchiu odnovremennoi registratsii slukhovykh vyzvannykh potentsialov kory golovnogo mozga i mikrofonnykh potentsialov ulitki).** B. M. Sagalovich and G. G. Melkumova (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, May 1981, p. 520-522. 15 refs. In Russian.

Auditory adaptation was examined in 35 rabbits exposed to white noise (90 dB, 0.00002 Pa, 10 min) by the simultaneous recording of evoked potentials of the brain and the neurotropic potentials of the cochlea. The effects of the neurotropic drugs galanthamine, GABA, and nanophyn on the auditory adaptation were also investigated. It is found that the mechanism of auditory adaptation is determined by processes in synapses in central parts of the auditory system and is monitored by the sympathetic nervous system. B.J.

**A82-25715 † Seasonal vascular tension variations in patients with cerebral circulatory disorders under the conditions of an arid zone (Sezonnye izmeneniia sosudistogo tonusa u bol'nykh s rasstroistvami mozgovogo krovoobrashcheniia v usloviiakh aridnoi zony).** A. K. Mamiev and K. O. Orazov (Turkmenskii Meditsinskii Institut, Ashkhabad, Turkmen SSR). *Zhurnal Nevropatologii i Psikhiatrii im S.S. Korsakova,* vol. 81, 1981, p. 41-45. 13 refs. In Russian.

**A82-25716 † Thyroid and hypophysial thyrotropic function in athletes during bicycle ergometer exercise (Sostoianie shchitovidnoi zhelezy i tireotropnoi funktsii gipofiza u sportsmenov pri veloergometricheskoi nagruzke).** A. B. Burkashov, T. D. Bol'shakova, V. A. Siluianova, V. N. Khomiakova, V. G. Borisov, and A. S. Nasonov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Problemy Endokrinologii,* vol. 27, Mar.-Apr. 1981, p. 21-26. 22 refs. In Russian.

**A82-25717 † Ultrastructural changes in skeletal muscle fibers under the influence of acute physical exercise (Izmeneniia ul'trastruktury skeletnykh myshechnykh volokon pod vliianiem ostrogo fizicheskogo napriazheniia).** M. D. Shmerling, E. E. Filiushina, and I. I. Buzueva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Feb. 1981, p. 43-49. 9 refs. In Russian.

The characteristics of the ultrastructural changes in the various types of skeletal muscle fibers which are associated with intense physical exercise are studied. Electron microscopic and stereomorphometric evaluations were performed on the anterior tibial muscles of rats isolated after a single bout of intense exercise (treadwheel running to exhaustion) or three daily intense exercise periods. Ultrastructural changes in both the energetic and contractile apparatus are observed in both the white and red muscle fibers studied, particularly a swelling of the sarcoplasmic reticulum, decrease in relative mitochondrial volume and sharp drop in glycogen content in the white fibers and intercellular edema, mictochondrial destruction and disturbances in myofibril organization in both types of fibers. The observed changes are attributed to an adaptive mechanism involving the rapid mobilization and exhaustion of cellular reserves. A.L.W.

**A82-25718 † Ultrastructural organization of AI and AIV zone projections of the cat auditory cortex to the posterior colliculi of the tectum opticum (Ul'trastrukturnaia organizatsiia proektsii zon AI and AIV slukhovoi kory mozga koshki v zadnikh kholmakh chetverokholmiia).** E. E. Granstrem (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Mar. 1981, p. 32-39. 27 refs. In Russian.

**A82-25719 † Neurophysiological basis for determining the biological significance of acoustic stimuli (Neirofiziologicheskie osnovy opredeleniia biologicheskoi znachimosti akusticheskikh stimulov).** G. A. Kulikov. *Leningradskii Universitet, Vestnik, Biologiia,* Nov. 1981, p. 80-87. 28 refs. In Russian.

**A82-25720 † Effects of pharmacological agents on the development of hematic hypoxia (Vliianie farmakologicheskikh sredstv na razvitie gemicheskoi gipoksii).** V. N. Kostiuchenkov and N. F. Farashchuk (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Farmakologiia i Toksikologiia,* vol. 45, Jan.-Feb. 1982, p. 76-79. 17 refs. In Russian.

The effects of various pharmacological agents on the development of extreme hematic hypoxia and the dynamics of metabolic processes are compared. Substances belonging to the classes of neuroleptics, adrenal blockers, sympathetic blockers, cholinergic blockers, adrenominetics, psychostimulants, antidepressants and soporifics were administered to rats prior to the injection of sodium nitrite, and evaluated according to animal survival rates and times. It is found that aminazin, apressin, inderal, dopegit, hemedyn and barbamyl all exhibit significant protective action in hematic hypoxia. This action may be connected with a reduced oxygen demand associated with the adrenal and sympathetic blockers, and a suppression of hypothalamic adrenoreactivity by barbamyl. A.L.W.

**A82-25721 † The effect of dipilodor, diazepam, pipolphen, and their combinations on the vasomotor reflex and respiration (Vliianie dipidolora, seduksena, pipol'fena i ikh kombinatsii na vazomotornyi refleks i dykhanie).** B. S. Grishin (Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Farmakologiia i Toksikologiia,* vol. 43, Nov.-Dec. 1980, p. 661-664. In Russian.

Tests performed on narcotized cats show that dipilodor and pipolphen inhibit vasomotor reflexes induced by pain stimulation while diazepam facilitates such reflexes. The administration of dipilodor after diazepam and pipolphen is conducive to the preservation of the inhibitory effect of the analgesic on the vasomotor reflexes, the depressant effect of the drug on respiration being eliminated. B.J.

**A82-25722 Nutrients that modify brain function.** R. J. Wurtman (MIT, Cambridge, MA). *Scientific American,* vol. 246, Apr. 1982, p. 50-59.

The activities of three nutrients which, when administered in pure form or ingested as food, give rise to important changes in the chemical composition of the brain and thereby modify brain functions are discussed. The nutrients are the amino acids tryptophan and tyrosine, and the lecithin constituent choline, which are precursors of the neurotransmitters serotonin, catecholamine and acetylcholine, respectively. Increases in the brain levels of its precursor enhance the synthesis of a neurotransmitter, which in turn may cause the amplification of neuron signals due to increased neurotransmitter release. The observations relating nutrient intake to neurotransmission originated in studies in which it was found that the amount of tryptophan available for conversion into serotonin depended on plasma amino acid ratios, suggesting a mechanism governing food preferences. Nutrient-neurotransmitter relations have been used in a variety of clinical applications, including the treatment of tardive dyskinesia, and in prospective treatments of memory disorders associated with old age, Parkinson's disease, hypertension and depression. A.L.W.

**A82-25801 † The participation of estradiol and progesterone in animal body mass regulation mechanisms (Uchastie estradiola i progesterona v mekhanizmakh reguliatsii massy tela u zhivotnykh).**

T. M. Eroshenko (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Problemy Endokrinologii*, vol. 28, Jan.-Feb. 1982, p. 82-88. 90 refs. In Russian.

**A82-25802** † **Reflexometry as an additional method of investigating hypoactivity in the thyroid gland (Refleksometriia kak dopolnitel'nyi metod issledovaniia pri gipofunktsii shchitovidnoi zhelezy).** G. A. Gaidina, L. S. Matveeva, and S. P. Lazareva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Problemy Endokrinologii*, vol. 28, Jan.-Feb. 1982, p. 34-38. 10 refs. In Russian.

In patients with severe and moderate hypothyroidism, a correlation is established between the Achilles tendon response time and certain biochemical indicators of thyroid activity. The study is carried out before treatment has begun or during substitution therapy with hormones. Also established is a correlation between the severity of the case and these indicators. It is found that the correlation continues to hold after treatment is begun, although restoration of the Achilles tendon response time lags behind the disappearance of other symptoms. It is concluded that this response time can serve as an additional criterion for diagnosing the existence and severity of hypothyroidism. C.R.

**A82-25803** † **The influence of the type of trophic interactions on the dynamics of a two-level ecosystem (Vliianie tipa troficheskikh vzaimodeistvii na dinamiku dvukhurovnevoi ekosistemy).** D. A. Sarancha (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Moscow, USSR). *Zhurnal Obshchei Biologii*, vol. 43, Jan.-Feb. 1982, p. 96-108. 6 refs. In Russian.

A mathematical model of an ecosystem comprising two trophic levels linked by interactions of the predator-prey type is considered. Each of the levels contains a large number of species. Equations are derived giving the total biomass of the levels. The behavioral dynamics of the biomass as a whole and of individual species is analyzed for various degrees of specialization in the predation. It is shown that trophic specialization leads to a stabilization of the ecosystem. C.R.

**A82-25804** † **The permeability of the lymphatic vessels of the muscles of the upper extremities in vibration sickness (Pronitsaemost' limfaticheskikh sosudov myshts verkhnikh konechnostei pri vibratsionnoi bolezni).** D. K. Abramovich-Poliakov, N. I. Pilipenko, R. I. Voloshina, S. P. Krakovskaia, and N. I. Teslenko (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii; Khar'kovskii Meditsinskii Institut; Khar'kovskaia Oblastnaia Klinicheskaia Bol'nitsa, Kharkov, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1981, p. 113-115. In Russian.

The permeability of the lymphatic capillaries of the muscles of the upper extremities in patients with vibration sickness is studied in a tracer experiment involving the use of I-131 labeled human serum albumin. The resorption of intramuscular labeled albumin into the lymphatic system is found to take place at a significantly faster rate in metal trimmers suffering from the first and second stages of vibration sickness than in controls, and to depend on the level of the disease. In addition, subjects suffering from the angiodistonic syndrome exhibited increased lymphatic vessel permeability only on the left side, while those with angiospastic syndrome exhibited a more marked enhancement in permeability on both sides. Results are explained by the effects of vibration and compensatory changes associated with it in increasing lymph capillary permeability due to the increased spasm activity of the blood capillaries. A.L.W.

**A82-25805** † **The significance of the pulmonary gas-exchange response in physical exercise testing for the evaluation of the effectiveness of mitral commissurotomy (Znachenie reaktsii legochnogo gazoobmena na fizicheskuiu nagruzku v otsenke effektivnosti mitral'noi komissurotomii).** L. F. Sherdukalova and L. O. Avakian (Ministerstvo Zdravookhraneniia Armianskoi SSR, Institut Kardiologii, Yerevan, Armenian SSR). *Sovetskaia Meditsina*, no. 1, 1982, p. 15-19. 10 refs. In Russian.

**A82-25806** † **Characteristics of oxygen metabolism in patients with chronic ischemic heart disease during physical exercise (Osobennosti kislorodnogo obmena u bol'nykh khronicheskoi ishemicheskoi bolezn'iu serdtsa pri fizicheskoi nagruzke).** E. Iu. Malchuk (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Sovetskaia Meditsina*, no. 1, 1982, p. 7-10. 13 refs. In Russian.

Changes in oxygen consumption, oxyhemoglobin dissociation and tissue oxygen levels at various levels of physical exercise are studied in patients with chronic ischemic heart disease. Measurements were performed on 120 patients with varying levels of exercise tolerance and 20 healthy controls during bicycle ergometer exercise at stepwise increasing levels. Increases in oxygen consumption are found in proportion to the level of exercise, however are lower in patients with low exercise tolerance than in the controls of patients with high tolerance. Increases in tissue oxygen content were practically absent in the low-tolerance group, while in those with a moderate tolerance increases were significantly lower than in the controls. An increase in the oxygen tension at which 50% of oxyhemoglobin was dissociated is observed equally in all groups, depending only on exercise performed. Tissue oxygen content is shown not to be strictly dependent on oxygen consumption, but to vary in response to additional factors including oxyhemoglobin dissociation, A.L.W.

**A82-25807** † **Computer analysis of tests involving physical stress (Komp'iuternyi analiz proby s fizicheskoi nagruzkoi).** R. A. Charchoglian, A. P. Golikov, L. S. Zingerman, I. Iu. Avdeeva, N. N. Esin, and S. P. Levshunov (Moskovskii Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR). *Sovetskaia Meditsina*, no. 1, 1982, p. 3-7. 8 refs. In Russian.

The goal is to assess the diagnostic possibilities of computer systems and to establish criteria for myocardial ischemia using computer data. The computer is found to shorten the time required for the test and to eliminate subjectivism in the diagnosis. In many cases, the computer is able to detect the ischemia earlier than a standard EKG. Ischemia is indicated by changes in the ST integral from values of +7 and above and in the ST index from values of -0.68 and below. C.R.

**A82-25808** † **The combined use of sulfamonomethoxine and UV radiation in the treatment of chronic pneumonia (Kompleksnoe primenenie sul'famonometoksina i UF-oblucheniia pri khronicheskoi pnevmonii).** S. A. Matveeva (Riazanskii Meditsinskii Institut, Ryazan, USSR). *Sovetskaia Meditsina*, no. 12, 1981, p. 85-87. 19 refs. In Russian.

**A82-25809** † **Kinetics of lipid peroxidation in cellular organelle anoxia under different conditions (Kinetika perekisnogo okisleniia lipidov v kletochnykh organellakh, perenesshikh anoksiiu v razlichnykh usloviiakh).** A. I. Dzhafarov (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziologii, Baku, Azerbaidzhan SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Oct. 1981, p. 425-427. 11 refs. In Russian.

**A82-25810** † **Damage to the Ca/2+/-transporting system in the sarcoplasmic reticulum of the heart during emotional and nociceptive stress (Povrezhdenie Ca/2+/-transportiruiushchei sistemy sarkoplazmaticheskogo retikuluma serdtsa pri emotsional'no-bolevom stresse).** F. Z. Meerson, Iu. V. Arkhipenko, I. I. Rozhitskaia, and V. E. Kagan (Akademiia Meditsinskikh Nauk SSSR; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Apr. 1981, p. 405, 406. In Russian.

**A82-25811** † **Mitotic activity and chromosome aberrations in the regenerated liver of rats after irradiation by X rays (Mitoticheskaia aktivnosti i khromosomnye aberratsii v regeneriruiushchei pecheni krys posle rentgenovskogo oblucheniia).** K. Kropacova and E. Misurova (Univerzita Pavla Jozefa Safarika, Kosice, Czechoslovakia). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Mar. 1981, p. 359-361. 13 refs. In Russian.

**A82-25812** † **Regulation of heart rhythm in depressor baroreflex (Reguliatsiia serdechnogo ritma pri depressornom barorefelkse).** S. F. Dugin and E. A. Gorodetskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi*

*Biologii i Meditsiny,* vol. 92, Oct. 1981, p. 387-389. 12 refs. In Russian.

It is noted that there is no consensus on the efferent mechanisms acting to increase the heart rate in depressor baroreflex. Experiments are carried out on unanesthetized cats 3-4.4 kg in weight in order to determine the dependence of the chronotropic reaction on the initial heart rate. It is found that the magnitude of this reaction depends on the spontaneous fluctuations in the original heart rate. C.R.

**A82-25813 † Indicators of the erythrocytic system of rabbits in hot, humid climates (Pokazateli eritrotsitarnoi sistemy krolikov v usloviiakh zharkogo vlazhnogo klimata).** A. N. Bulygin (Ivanovskii Meditsinskii Institut, Ivanovo, USSR), R. O. Fernández, and P. L. Souti (Habana, Universidad, Havana, Cuba). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Oct. 1981, p. 394, 395. 8 refs. In Russian.

**A82-25814 † Effects of whole-body vibration and noise on the toxicity and risk parameters of chemical substances (Vliianie obshchei vibratsii i shuma na parametry toksichnosti i opasnosti khimicheskikh veshchestv).** R. Ia. Shterengarts and N. I. Solomatina. *Gigiena i Sanitariia,* May 1981, p. 86, 87. In Russian.

The effects of whole-body vibration and accompanying noise as found in transportation and manufacturing work environments on the toxicity and risk factors associated with the basic ingredients of exhaust gases are investigated. Experiments involved the exposure of animals to vibration at 4-63 Hz and 0.12-0.21 m/sec per sec and associated noise for 4 hours daily for a period of 2 months. Vibration and noise are found to decrease measured LD50 and CL50 for benzole, formaldehyde, SO2 and NO2 by 10-30%, while the thresholds for acute and chronic effects are decreased two- to six-fold, and more. The cumulation coefficient for the substances with cumulative properties (benzole, formaldehyde) is increased from 2 to 4 times by vibration and noise, most likely due to the slowing of toxin elimination processes. Results suggest the advisability of lowering maximum chemical exposure limits in vibration environments. A.L.W.

**A82-25815 † Thermoregulation and morbidity in coal miners (Sostoianie termoreguliatsii i zabolevaemost' gornorabochikh ugol'nykh shakht).** L. M. Poliak (Vostochnyi Nauchno-Issledovatel'skii Institut po Bezopasnosti Rabot v Gornoi Promyshlennosti, Kemerovo, USSR) and F. Kh. Zinger (Donetskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Gigiena i Sanitariia,* July 1981, p. 73, 74. In Russian.

The thermal status of coal miners is evaluated and compared with their morbidity experience. Measurements of skin temperature and visual-motor reaction time were made four times during a work shift: in the changing room, immediately before descent into the mine, after exit from the shaft, and after arrival at the changing room from the mine. Skin temperature is found to decline and reaction time to increase in proportion to the time spent in travelling to and from the mine on foot or in an unheated transport while wearing the mining outfit. Examination of morbidity statistics reveals a significantly greater proportion of respiratory diseases in miners transported to the shaft in an unheated transport than in those using a covered walkway, and a significant incidence of pyodermatitis, which is attributed to both cooling and coal dust in the work environment. Results suggest the potential of heated transports and covered walkways in reducing miner morbidity and increasing productivity. A.L.W.

**A82-25816 † Dose loads to personnel engaged in the preparation of radioisotope thickness gages (Dozovye nagruzki personala, zaniatogo izgotovleniem radioizotopnykh tolshchinomerov).** M. I. Kostenetskii (Zaporozhskaia Oblastnaia Sanepidstantsiia, Zaporozhe, Ukrainian SSR). *Gigiena i Sanitariia,* Aug. 1981, p. 69, 70. In Russian.

**A82-25817 † Experience with the development and practical introduction of operational reference levels for radiation safety (Opyt razrabotki i prakticheskogo vnedreniia rabochikh kontrol'nykh urovnei radiatsionnoi bezopasnosti).** A. V. Epishin (Gor'kovskaia Oblastnaia Sanepidstantsiia, Gorki, USSR). *Gigiena i Sanitariia,* Aug. 1981, p. 70-72. In Russian.

**A82-25818 † Use of mathematical modeling for the determination of allowable quantities of chemical fibers in clothing (Ispol'zovanie matematicheskogo modelirovaniia dlia opredeleniia dopustimogo kolichestva khimicheskikh volokon v odezhde).** K. A. Rapoport, S. F. Iokina, and E. V. Isaeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena i Sanitariia,* Aug. 1981, p. 46-48. In Russian.

**A82-25819 † Effects of emotional stress in bus drivers (Vliianie emotsional'nogo napriazheniia u voditelei avtobusov).** T. I. Akhmedov (Ukrainskii Institut Usovershenstvovaniia Vrachei, Kharkov, Ukrainian SSR). *Gigiena i Sanitariia,* May 1981, p. 75, 76. 7 refs. In Russian.

The effects of the nervous and emotional stresses encountered in operator activity on intersensory interactions are investigated in bus drivers of various levels of experience. Evaluations of subject optical, kinetic and auditory thresholds and the correlations between them were performed before and after the work shift in drivers exhibiting different motivational and emotional states. Results demonstrate the feasibility of using intersensory correlation levels and changes in them during the work shift in the evaluation of nervous and emotional fatigue, the assessment of readiness for specialized functions, and the development of optimal work-rest cycles. A.L.W.

**A82-25820 † Biophysical methods for the study of ecosystems and the control of biosynthesis within them (Biofizicheskie metody issledovaniia ekosistem i upravleniia ikh biosintezom).** I. A. Terskov (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk,* Dec. 1981, p. 59-67. 95 refs. In Russian.

Work carried out in the period 1975-1980 concerning the organizational principles of cellular systems of various levels of complexity and technological means for their control is reviewed. Theoretical and experimental efforts included the development of steady-state biophysical systems performing high-rate biosynthesis studies of the development of open and closed ecosystems, and highly closed ecosystems containing man. Studies with practical applications involved the growth of high-protein hydrogen bacterial biomass as well as carboxiodobacteria, iron-oxidizing bacteria, luminescent bacteria, and thermophilic blue-green algae, plant growth under high illumination, the growth of invertebrates in nonproportional flow cultures, the remote sensing of ecosystem conditions, and bathyphotometric sounding. Future efforts with practical applications are planned in the areas of the biophysical bases for biosynthesis control in cells and organisms, the homeostasis control, the construction of artificial ecosystems and biophysical systems for monitoring natural environments. A.L.W.

**A82-25821 † Theoretical and experimental analysis of material turnover in a closed microecosystem. I - Construction of a mathematical model (Teoretiko-eksperimental'nyi analiz krugovorota veshchestva v zamknutoi mikroekosisteme. I - Postroenie matematicheskoi modeli).** N. S. Abrosov, V. G. Gubanov, and B. G. Kovrov (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk,* Dec. 1981, p. 68-75. 25 refs. In Russian.

A mathematical model of a simple closed microecosystem is developed which takes into account the dynamics of the fundamental elements limiting biological processes and the consumption of light energy, and may be used as a basis for experiments on an actual microcosm. The model considers a homogeneous ecosystem containing one type of producer (autotroph) and one type of reducer (heterotroph), which is capable of supporting the processes of biomass growth, respiration, and death and the mineralization of nonliving organic matter. Equations are formulated within the framework of the concept of systems with limiting factors. A.L.W.

**A82-25822 † Equipment for artificial pulmonary ventilation and inhalation anesthesia (Apparaty iskusstvennoi ventiliatsii legkikh i ingaliatsionnogo narkoza).** R. I. Burlakov, Iu. S. Gal'perin, and A. I. Trushin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Meditsinskaia Tekhnika,* Mar.-Apr. 1981, p. 24-27. In Russian.

Equipment currently available for use in artificial pulmonary ventilation and inhalation anesthesia applications is reviewed. The artificial ventilation equipment may be divided into two categories: that intended for the provision of prolonged pulmonary ventilation, which utilize two energy sources for breath generation and control and show an increasing tendency to incorporate electronic measurement and control circuits, and that intended for short-term use during anesthesia or emergency resuscitation, which are also using electronic control to expand their functional capabilities. Inhalation anesthesia equipment is developing in the areas of improved measuring equipment and features assuring ease of operation, including portability and gas analysis. A.L.W.

**A82-25823** † **Diurnal rhythm of sleep and wakefulness in arctic suslik /Citellus parryi/ during summer season (Sutochanaia periodika sna i bodrstvovaniia u arkticheskogo suslika Citellus parryi v letnii period).** I. E. Chepkasov (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa, Magadan, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 17, Jan.-Feb. 1981, p. 77-80. 10 refs. In Russian.

**A82-25824** † **Effect of low ambient temperatures on sleep-wakefulness periodicity in lemming /Dicrostonyx torquatus/ (Vliianie nizkikh temperatur sredy na periodiku bodrstvovanie-son u lemminga Dicrostonyx torquatus).** V. S. Sazonov (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa, Magadan, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 17, July-Aug. 1981, p. 391-394. 17 refs. In Russian.

**A82-25825** † **Results of the treatment of patients with chronic bronchitis at health resorts in contrasting climatic zones during different seasons (Rezul'taty kurortnogo lecheniia bol'nykh khronicheskim bronkhitom v kontrastnykh klimaticheskikh zonakh v razlichnoe vremiia goda).** D. A. Iakhontov (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Sept.-Oct. 1981, p. 16-18. 5 refs. In Russian.

**A82-26047** **Cockpit automation and workload reduction - Too much of a good thing.** C. Bulloch. *Interavia,* Mar. 1982, p. 263, 264.

Three important lines of inquiry in the area of cockpit automation and pilot workload reduction involve the definition and measurement of aircrew workload, the consideration of what is optimum workload, and examination of disadvantages of automation. Growing evidence indicates that people have multiple capacity pools of intellect that can be tapped simultaneously, particularly when the tasks performed by the brain are different in nature. Physiological tools such as infrared video cameras and electroencephalographs show that the eye and brain are stimulated by and respond to both internal and external events. Extensive automation tends to degrade the pilot's skills and may actually increase hazards for some aircraft. The chief driving force toward automation is not safety, but reduction of personnel costs. C.D.

**A82-26228** **Cardiorespiratory assessment of 24-hour crash-diet effects on altitude, +Gz, and fatigue tolerances.** M. T. Lategola, P. J. Lyne, and M. J. Burr (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 201-209. 30 refs.

The effects of crash dieting, defined as total abstinence from food but not water, on pilot tolerances to fatigue under a submaximum physical workload, simulated +Gz exposure and moderate altitude are investigated. Subjects medically qualified as pilots underwent physiological monitoring for hemodynamic and respiratory functions during 2 min of lower body negative pressure of -40 torr (equivalent to +2Gz), 118 min of exposure to a simulated altitude of 3810 m, and ergometry at 50 W for 6 min, all preceded or not by a 24-hour fast. Ten out of the 11 subjects maintained adequate blood oxygenation during altitude exposure and tolerated 2 min of LBNP at altitude and pedal ergometry after fasting or not fasting, while a single subject experienced syncope during LBNP after fasting. Results suggest the advisability of warning general aviation pilots to avoid maneuvers with accelerations greater than +2Gz immediately after a total food fast of 24 h or more. A.L.W.

**A82-26229** **Physiological, biochemical, and performance responses to a 24-hour crash diet.** E. A. Higgins, H. W. Mertens, J. M. McKenzie, and G. E. Funkhouser (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 210-217. 26 refs.

The effects of a 24-h crash diet, during which no food is taken, on pilot task performance, and physiological and biochemical parameters are investigated. Twelve healthy but overweight male subjects, able to pass a Class III pilot medical examination, were monitored for hemodynamic parameters, blood and urinary composition and subjective fatigue and performed a series of multiple task performance tests while breathing a gas mixture equivalent to 3310 m altitude during 28 h of either fasting or a standardized eating regimen. Whereas no significant differences between fasting and control periods were found in heart rate, blood pressure, serum electrolytes, subjective fatigue and urinary excretion of K(+), epinephrine and norepinephrine, body temperatures were lower during fasting and serum glucose levels decreased. Hematocrit increased more for the crash diet than the normal, while urinary 17-ketogenic steroid excretion during sleep was less. Complex task performance showed no significant differences at low workloads, however performance was enhanced at medium and high workloads during fasting. A.L.W.

**A82-26230** * **Conditioned feeding suppression in rats produced by cross-coupled and simple motions.** R. A. Fox (San Jose State University, San Jose, CA) and N. G. Daunton (NASA, Ames Research Center, Moffett Field, CA). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 218-220. 16 refs. Grant No. NCA2-OR-675-801.

Results are presented of an experiment on the induction of motion sickness in rats by the use of cross-coupled accelerations of magnitudes similar to those used in human experiments. Accelerations were produced in a seesaw apparatus with rotating disks supporting the animal cages mounted on each seesaw arm, and motion sickness was assessed according to the consumption of a sweet food previously offered to the animals immediately before the motion treatment. During a 1-hour test session 72 h after motion treatment and after a 24-h fast, rats having undergone cross-coupled vertical sinusoidal and rotational motion are observed to consume less food than those having experienced either type of motion alone, or no motion. The ordering of the conditioned suppressive feeding effects is consistent with the amounts of vestibular stimulation produced by the respective motions. The results support the existence of motion sickness effects in rats, even though they are unable to vomit. A.L.W.

**A82-26231** **Phenytoin - Ineffective against acute mountain sickness.** R. L. Burse, M. Landowne, A. J. Young, and J. T. Maher (U.S. Army, Research Institute of Environmental Medicine, Natick, MA). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 221-225. 26 refs.

**A82-26232** **Hemodynamic responses in orthostasis following 5 hours of sitting.** E. Shvartz, R. C. Reibold, R. T. White, and J. G. Gaume (Douglas Aircraft Co., Long Beach, CA). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 226-231. 39 refs.

The effects of a prolonged period of quiet sitting on hemodynamic responses during orthostasis are determined in light of the possible adverse effects of sitting fatigue on pilot performance. Subjects were administered an orthostatic test consisting of 20 min of quiet standing before and after 5 h of quiet sitting, and hemodynamic responses, including heart rate, blood pressure, stroke volume and calf and thigh blood flow, were recorded. During the 5-h sitting period, increases in blood pressure and total peripheral resistance are found, along with a decrease in calf blood flow and an increase in venous pooling in the calf. With respect to the pre-sitting orthostatic test, subjects exhibited decreased heart rate and cardiac output, increased pressure and total peripheral resistance, decreased calf blood flow and increased calf venous pooling during the second test. Results demonstrate that prolonged sitting constitutes a mild orthostatic stress in which an increase in venous pooling is compensated by an increase in blood pressure, whereas the subsequent transition to standing elicits insufficient compensation resulting in a low cardiac output. A.L.W.

**A82-26233** **G-tolerance enhancement - Straining ability comparison of aircrewmen, nonaircrewmen, and trained centrifuge subjects.** J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 232-234. 9 refs.

A comparative study is presented of the abilities of fully trained aircrewmen, nonaircrewmen and trained centrifuge subjects to increase their acceleration tolerance by the use of a protective straining maneuver. Tolerances to +Gz acceleration were measured in 198 aircrewmen, 131 nonaircrew and 27 trained acceleration subjects during relaxed gradual onset acceleration runs and gradual onset acceleration runs using straining maneuvers. Although no significant differences are found between the relaxed tolerances of any of the groups, the trained centrifuge subjects exhibited an approximately 1 G greater enhancement in straining tolerance over relaxed than both the nonaircrewmen and the aircrewmen, who included trained fighter, attack and reconnaissance pilots. It is suggested that significant enhancements in pilot acceleration tolerance may be achieved by specific G training, preferably during undergraduate pilot training. A.L.W.

**A82-26234** **The wearing of hydrophilic contact lenses aboard a commercial jet aircraft. I - Humidity effects on fit.** W. G. Eng, L. K. Harada, and L. S. Jagerman (Eye Clinic, Alameda, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 235-238. 12 refs. Research supported by the Barnes-Hind Pharmaceutical Co.

The environmental conditions in a commercial jet aircraft cabin are evaluated in relation to possible changes in the fit of hydrophilic (soft) contact lenses during flight. Measurements of cabin pressure, humidity and temperature were made during a round-trip flight between Oakland, CA, and Honolulu, HI, concurrently with keratometer measurements of lens fit in seven subjects fitted with hydrophilic lenses. Data indicate the cabin environment to be essentially the same for both flights, with humidity declining from 47% to 11% shortly after takeoff, pressure declining immediately after takeoff, and temperature remaining constant. No significant differences in fit are found between subjects using and not using hydrating eyedrops. A moderate blurring and distortion of the projected pattern on the lens surface was observed, which is closely related to the change in cabin humidity. A.L.W.

**A82-26235** **Increase in jammed word intelligibility due to training of listeners.** C. W. Nixon, R. L. McKinley, and T. J. Moore (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 239-244. 5 refs.

The occurrence of a learning process associated with the understanding of voice communications in the presence of jamming signals is investigated. Work intelligibility was measured as a function of time for naive subjects wearing standard flight helmets and oxygen masks and communicating through a standard aircraft intercommunication system under typical communication conditions, in the presence of simulated cockpit noise, and in the presence of a jamming signal in the simulated noise. Subject performance is observed to improve with time in each communications environment, requiring periods of approximately 75 min, 60 min and 300 min to reach a learning plateau in the baseline, additional noise, and noise with jamming environments, respectively. Performance is also observed not to deteriorate following a two-week period away from the task. Recommendations are made for further study of such factors as jammer-specific performance, fatigue effects, individual differences and training models and specifications. A.L.W.

**A82-26236** **An introduction to disaster - Some considerations of a psychological nature.** T. J. Singer (U.S. Navy, Pacific Fleet, Naval Air Station North Island, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 245-250. 42 refs.

Literature dealing with the psychological reactions of victims and relief personnel to disaster is reviewed. Individual and group reactions, which are most often adaptive and responsible rather than panicked or psychotic, can be divided into phases, including a period of impact, period of recoil and post-traumatic period. The specific reactions encountered range from anger, guilt, defensive psychological reactions, fear of insanity, abnormal behavior resulting from medical problems, and panic to long-term reactions affecting physical and mental health, and are often encountered in rescue workers as well as disaster victims. Experience with disasters and crisis intervention has suggested the effectiveness of psychological first aid in alleviating psychological distress and preventing long-term emotional problems, and has pointed out the potential value of planning for the provision of post-disaster crisis intervention and psychological support. A.L.W.

**A82-26237** **Serial personality evaluations of repatriated U.S. Air Force southeast Asia POWs.** R. D. Wheatley (USAF, School of Aerospace Medicine, Brooks AFB, TX) and R. J. Ursano (University of the Health Sciences, Bethesda, MD). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 251-257. 19 refs. USAF-supported research.

Preliminary results of psychometric evaluations of all 332 repatriated U.S. Air Force former prisoners of war in southeast Asia are presented. The repatriated POWs (RPWs), who were divided into groups captured before and after 1969, responded to a Minnesota Multiphasic Personality Inventory (MMPI) within a year of return and after a period of 5 years. Group MMPI profiles of the pre- and post-1969 RPW groups fell within normal limits on each of the clinical scales and resembled fairly closely those of a reference group of current aircrewmembers. Observations suggest, however, that the pre-1963 group deviated farther from normal than the post-1969 group, showing increased repression and denial and greater suspicion and distrust, and remained essentially unchanged in serial evaluations while the post-1969 group moved toward the aircrew standard. It is concluded that the pre-1969 RPWs, who had a significantly longer and harsher captivity experience, may be at increased risk for psychological distress. A.L.W.

**A82-26238** **Syncope in aircrew.** W. H. Sledge (Yale University, New Haven, CT) and J. A. Boydstun (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 258-265. 6 refs. AF Project 7755-18-08.

A study is reported of the role of psychosocial factors in the onset of various forms of syncope in aircrew members. Aircrew referred for medical evaluation as a result of fainting episodes and unrelated problems underwent a standardized psychiatric interview, psychological tests and a complete medical evaluation. Comparison of groups diagnosed as exhibiting vasovagal, micturition and miscellaneous syncopes with the controls indicates little differences in personality and character traits, although differences on the mental status examination suggest that both the vasovagal and micturition syncope patients were more prone to anxiety and increased defensiveness. Psychological tests indicate some slight nonspecific differences between the vasovagal and control patients and the micturition and control patients. The vasovagal patients tended to be more anxious about their job and evidence increased affective arousal around the time of the fainting episode relative to the controls and the micturition patients, who exhibited a greater frequency of antecedent illness. Psychological consequences of syncope are similar in the three groups. A.L.W.

**A82-26239** **Clinical and experimental evidence for the use of hypothermia in decompression sickness.** E. H. Simmons, S. W. O'Driscoll, and J. A. Gamarra (Toronto East General and Orthopaedic Hospital; Toronto, University, Toronto, Canada). *Aviation, Space, and Environmental Medicine*, vol. 53, Mar. 1982, p. 266-268. 11 refs. Research supported by the Rehabilitation Foundation for the Disabled and Workmen's Compensation Board of Ontario.

Clinical experience and experimental data concerning the use of hypothermia in the treatment of decompression sickness is presented. The clinical material was provided in observations of cases of decompression sickness in workers during the construction of a sewer and subway. In certain severe cases, recompression alone was insufficient to relieve major manifestations of decompression sickness, and improvement occurred only after the application of at first regional, then general, hypothermia. Experiments involved the exposure of rabbits to pressures of 60 or 70 psi for one hour, followed by sudden decompression over 70 sec. Mortality rates approached 100% in untreated rabbits or rabbits placed in air at 0 C after decompression, while cooling in water at 3 C for a period of 4 min significantly reduced the mortality. Results support the use of hypothermia as an adjunctive mode of therapy for decompression sickness, and justify further experimental and clinical investigations. A.L.W.

**A82-26240** **Sarcoidosis in aircrew.** A. J. C. Balfour (RAF, Institute of Pathology and Tropical Medicine, Aylesbury, Bucks., England). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Aylesbury, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 269-272. 10 refs.

The prevalence of sarcoidosis in military aircrew involved in fatal aircraft accidents is discussed in light of the recent finding that sarcoidosis is frequently capable of causing collapse and sudden death. Examination of the prevalence of sarcoid-like granulomata upon autopsy of aircraft accident fatalities reveals the lesions to be present in 3.06% of military aircrew, but only 1.4% and 1.03% of civil pilots, and passengers and glider pilots, respectively. When compared with the clinical incidence of sarcoidosis, the postmortem prevalence seems high, particularly in aircrew, however may be explained in part by the presence of subclinical disease. In the 13 accidents with sarcoid-like granulomata found at autopsy, seven may have been caused by pilot incapacitation, a consequence of 5-10% of all cases of sarcoidosis. The association between sarcoidosis and fatal accidents may then be causal, a result of predisposing factors in aviation to the development of the disease, or a chance finding. A.L.W.

**A82-26241** **The diving response in clinical medicine.** B. A. Booden (Queen's Medical Centre, Nottingham, England; Repatriation General Hospital, Daw Park, Australia). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 273-276. 42 refs.

The diving response has seen application in recent years to the therapeutic treatment of paroxysmal supraventricular tachycardia and the investigation of autonomic nervous system dysfunction, however its use has been limited due to user uncertainties. The present paper reviews current knowledge of the factors influencing the diving response in man, procedures for optimizing its clinical effectiveness and the relation of the response to evoked and pre-existing arrhythmias. The diving response depends upon features of breath-holding and face immersion, as well as general personal factors. It is best induced with the patient in a relaxed condition, with breath held for a period of 20 to 30 sec while the face is immersed in water at 20 to 10 C. Cardiac arrhythmias experienced during the diving response have included nodal rhythm, atrial and ventricular ectopic beats, escape beats and idioventricular rhythm, although none has been known to be irreversible or fatal. Evidence thus indicates that the procedure is safe, however it would be wise to use it with resuscitation facilities available. A.L.W.

**A82-26242** **Follow-up of 14 abnormal electroencephalograms in asymptomatic U.S. Air Force Academy cadets.** W. D. Everett and M. S. Akhavi (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 277-280. 8 refs.

The paper reports a 10-15 year follow-up study of 14 former U.S. Air Force Academy cadets disqualified from flight training on the basis of electroencephalogram abnormalities. The individuals were identified as having Mayo Classification Grade III dysrhythmias, including focal or diffuse spikes, sharp waves or spike slow wave complexes, upon the screening of 2947 asymptomatic cadets from 1965 through 1969. The observed EEG abnormalities are not correlated with a past history of head trauma. In the 10-15 years following detection, none of the subjects developed a seizure disorder. Results thus do not provide justification for the current military practice of disqualifying asymptomatic individuals on the basis of abnormal EEG patterns alone, as the incidence of seizures in this population is quite low. A.L.W.

**A82-26243** **Tennis elbow in aviators.** R. W. Farr (U.S. Navy, San Francisco, CA). *Aviation, Space, and Environmental Medicine,* vol. 53, Mar. 1982, p. 281, 282. 5 refs.

Three cases of lateral epicondylitis (tennis elbow) in aviators are described, and the symptomology, etiology, treatment and prevention of the disorder are discussed. The presenting complaint of lateral epicondylitis is lateral elbow pain sometimes radiating down to the wrist, and the disorder is seen to develop in individuals performing activities involving repeated flexion and extension of the wrist against resistance, or repeated pronation and supination of the forearm with the elbow extended. Relief of symptoms can usually be achieved with conservative therapy, including a limitation of hand motion, splints, salicylates, steroid injections and isometric exercise. In the three case histories presented, two were attributed to duties involving flight operations, and symptoms were alleviated by a temporary suspension from flight operations, coupled, in one case, by changes in biomechanical modalities of performing the aggravating motion. A.L.W.

**A82-26522** † **The physiology and hygiene of the individual protection of man from the cold (Fiziologiia i gigiena individual'noi zashchity cheloveka ot kholoda).** V. S. Koshcheev. Moscow, Izdatel'stvo Meditsina, 1981. 288 p. 388 refs. In Russian.

The hygienic and normal and pathological physiological aspects of the development and evaluation of equipment for the individual protection of man from the cold as encountered in polar and underwater environments are discussed. The physiological characteristics of heat exchange under conditions of cooling are examined, with attention given to thermoregulatory responses to whole-body and local cooling, the optimal and allowable thermal conditions for work in the cold, physiological limits to cooling, and means for the rapid normalization of thermal condition following cooling. Biotechnological questions of individual protection from the cold are then considered, including the construction and use of everyday winter clothing, individual protective systems and protective systems with supplemental heating, and the protection of the face and respiratory organs during work in the cold, and protective equipment for work in the cold is presented. A.L.W.

**A82-26525** † **Pathological anatomy and ultrastructure of the heart /Combined morphological investigation of the general pathological process in the myocardium/ (Patologicheskaia anatomiia i ul'trastruktura serdtsa /Kompleksnoe morfologicheskoe issledovanie obshchepatologicheskogo protsessa v miokarde/).** L. M. Nepomniashchikh (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). Novosibirsk, Izdatel'stvo Nauka, 1981. 324 p. 730 refs. In Russian.

The morphogenesis, pathological anatomy and ultrastructural manifestations of myocardial pathologies are examined on the basis of light, polarization and electron microscopy, and stereological, and histochemical studies. Following a review of contemporary methods for the structural and histocytochemical study of the heart, results of electron microscopic, histochemical and stereometric studies of the normal heart and its development are presented. Attention is also given to cardiac morphology in models of localized myocardial damage, experimental myocardial infarction, experimental atherosclerosis and ischemic heart disease. The structural bases of the adaptive and compensatory responses in the development of general cardiac pathology are then discussed in relation to parenchymatous-stromal-microcirculatory interelations. A.L.W.

**A82-26547** † **Systemic brain activity /Experimental investigation/ (Sistemnaia deiatel'nost' mozga /Eksperimental'noe issledovanie/).** N. A. Shustin. Leningrad, Izdatel'stvo Nauka, 1980. 104 p. 180 refs. In Russian.

The book represents a synthesis of experimental investigations and literature data concerning the organization of the integrative functions of the brain during conditioned reflex activity as a model of more complex forms of systemic activity. Experiments involved the study of conditioned motor reflexes in the dog to the relations between two stimuli presented either simultaneously or in sequence, and the effects of the removal of the frontal lobe on the formation of these reflexes. The activities of the motion analyzer, stimulus properties, and the motor and secretory components is discussed, together with the role of the prefrontal lobes in the organization of the response. A.L.W.

**A82-26550** † **Physics and biology (Fizika i biologiia).** M. V. Vol'kenshtein. Moscow, Izdatel'stvo Nauka, 1980. 152 p. 46 refs. In Russian.

Important problems in contemporary biological physics are discussed. Following a review of the historical development of biophysics as the branch of science concerned with the study of life based on the laws and methods of experimental physics, consideration is given to the fundamental principles of physics and chemistry, the properties of electron waves, strong and weak molecular interactions, and the physics of macromolecules. The fields of molecular biophysics and molecular biology are discussed, and questions of protein biosynthesis and the genetic code, cellular biophysics and bioenergetics, thermodynamics and information theory in biology, the physical and mathematical modeling of biological processes and biological development are examined.

A.L.W.

**A82-26582 *** **Plant response to solar ultraviolet radiation.** M. M. Caldwell. In: Physiological plant ecology I. Berlin, Springer-Verlag (Encyclopedia of Plant Physiology New Series. Volume 12 A), 1981, p. 169-197. 82 refs. NASA-sponsored research.

Plant reactions and mechanisms of reaction to solar UV radiation are reviewed, along with characteristics of plants which enhance UV tolerance. Wavelength regions to which proteins are particularly sensitive are examined and the possibility of synergistic effects from photoreactions to multiple wavelengths is considered, along with available evidence of nonadditive plant spectral responses to UV radiation. Decreases in atmospheric ozone content are explored in terms of UV wavelengths which would increase with the ozone decreases, particularly for UV-B, which depresses photosynthesis and would increase 1% with a 16% reduction of stratospheric ozone. Higher elevations are projected to display effects of increased UV incident flux first, and global distributions of UV increases due to atmospheric inhomogeneity and water surface clarity are examined. Finally, the response of plant nucleic acids, DNA, chlorophyll to enhanced UV are described, along with repair, avoidance, and optical mechanisms which aid plant survival. M.S.K.

**A82-26583 *** **A model for protocellular coordination of nucleic acid and protein syntheses.** S. W. Fox (Miami, University, Coral Gables, FL). *(International Society for the Study of the Origin of Life, Symposium on Biochemical Evolution of the Genetic Apparatus, Potsdam, NY, July 2, 1980.)* In: Science and scientists. Tokyo, Japan Scientific Societies Press, 1981, p. 39-45. 41 refs. Grant No. NGR-10-007-008.

The proteinoid model for the coordination of protein synthesis with nucleic acid coding within the evolving protocell is discussed. Evidence for the self-ordering of amino acid chains, which would enhance the catalytic activity of a lysine-rich proteinoid, is presented, along with that for the preferential formation of microparticles, particularly proteinoid microparticles, in various solutions. Demonstrations of the catalytic activity of lysine-rich proteinoids in the synthesis of peptide and internucleotide bonds are pointed out. The view of evolution as a two stage sequence in which the geological synthesis of peptides evolved to the protocellular synthesis of peptides and oligonucleotides is discussed, and contrasted with the alternative view, in accord with the central dogma, that nucleic acids arose first then governed the production of proteins and protocells.

A.L.W.

**A82-26589 *** **Copolyamino acid fractionation and protobiochemistry.** S. W. Fox (Miami, University, Coral Gables, FL). *Journal of Chromatography,* vol. 215, 1981, p. 115-120. 39 refs. Grant No. NGR-10-007-008.

Investigation of the origins of living things by the uniquely appropriate method of successive approximation in attempted retracement of steps in molecular evolution has yielded: a comprehensive theoretical flowsheet from archaic inanimate matter to an infrastructured, microscopic, protoreproductive, protometabolic protocell; a laboratory model of the same; and an explanatory assessment of the natural variation component of Darwinian evolution. For each of these, the significance is dependent upon awareness of the intrinsic tendency of amino acids, in mixed sets, to order themselves. Without such awareness, it is believed these vistas would have been delayed for decades. Selfordering would have in turn been difficult to recognize and support were it not for the chromatographic developments in fractionation of copolyamino acids. (Author)

**A82-26596 *** **Models for protocellular photophosphorylation.** P. R. Bahn and S. W. Fox (Miami, University, Coral Gables, FL). *BioSystems,* vol. 14, 1981, p. 3-14. 69 refs. Grant No. NGR-10-007-008.

Several photoreactions for transducing light energy have been analyzed for their relevance as models for protocellular photophosphorylation. Inorganic ions and compounds could have played a role in protocellular photophosphorylation. Organic catalysts may have been the next significant agents used by protocells for photophosphorylation. Membranous photophosphorylation probably became the most recent type of photoenergy transduction to be acquired by protocells; it is still used by modern cells although components of the other types of phosphorylation are found in present day cells. Recorded yields of energy-rich phosphates from the model reactions discussed are small. Arguments are advanced that such yields could have been sufficient to have fueled protocellular metabolism, which was probably very slow compared to modern cellular metabolism. Future prospects for research in this area are discussed. (Author)

**A82-26597 *** **Formation of peptides from amino acids by single or multiple additions of ATP to suspensions of nucleoproteinoid microparticles.** T. Nakashima and S. W. Fox (Miami, University, Coral Gables, FL). *BioSystems,* vol. 14, 1981, p. 151-161. 47 refs. Grant No. NGR-10-007-008.

The synthesis of peptides from individual amino acids or pairs of amino acids and ATP in the presence of catalysis by nucleoproteinoid microparticles is investigated. Experiments were performed with suspensions formed from the condensation of lysine-rich and acidic proteinoids with polyadenylic acid, to which were added glycine, phenylalanine, proline, lysine or glycine-phenylalanine mixtures, and ATP either at once or serially. Peptide yields are found to be greatest for equal amounts of acidic and basic proteinoids. The addition of imidazole is found to alter the preference of glycine-phenylalanine mixtures to form mixed heteropeptides rather than homopeptides. A rapid ATP decay in the peptide synthesis reaction is observed, and a greater yield is obtained for repeated small additions than for a single addition of ATP. The experimental system has properties similar to modern cells, and represents an organizational unit ready for the evolution of associated biochemical pathways. A.L.W.

**A82-26602 *** **Effects of ultraviolet-B irradiances on soybean. IV - Leaf ontogeny as a factor in evaluating ultraviolet-B irradiance effects on net photosynthesis.** A. H. Teramura (Maryland, University, College Park, MD) and M. M. Caldwell (Utah State University of Agriculture and Applied Science, Logan, UT). *American Journal of Botany,* vol. 68, Aug. 1981, p. 934-941. 26 refs. Contract No. NAS9-14871.

**A82-26611** **Identification of the human operator in a closed-loop system (Identifikatsiia na choveka-operator v zatvorena sistema za upravlenie).** I. P. Popchev, I. D. Zaprianov, and K. I. Tropolov (B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika i Robotika, Sofia, Bulgaria). *Problemi na Tekhnicheskata Kibernetika i Robotikata,* vol. 13, 1981, p. 18-26. 12 refs. In Bulgarian.

The paper describes the synthesis of a nonlinear mathematical model of the human operator, viewed as a dynamic plant in a closed-loop system. The approach is based on a functional representation with Volterra-Wiener series. After two-step identification, a second-order nonlinear model is synthesized, with a significantly wider range of sufficiency than in quasi-linear models. As an example, the procedure is applied to the simulation of a one-dimensional system for the control of dynamic objects. B.J.

**A82-26751 †** **The sensitivity of silent and spontaneously active cat cerebral cortex neurons to anoxia (Chuvstvitel'nost' 'molchashchikh' i fonovoaktivnykh neironov kory mozga koshki k anoksii).** M. O. Samoilov, D. G. Semenov, N. G. Iarantsev, and S. A. Evdokimov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Jan. 1982, p. 3-8. 20 refs. In Russian.

Changes in the bioelectrical activity and redox state of both silent and spontaneously active neurons of the cat motor cortex with the onset of anoxia are investigated. Experiments involved the use of simultaneous morphophysiological and spectrophotometric studies of single pyramidal cells combined with in vivo microscopy under conditions of normal and interrupted oxygen supply. Neuron activation by a seizure discharge upon anoxia is observed to be accompanied by a well-defined, marked disturbance in the intracellular redox system, particularly in the silent cells. In contrast, the spontaneously active cells exhibited no noticeable increase in degree of reduction during the initial stages of the change in impulse activation associated with anoxia. A.L.W.

**A82-26752 †** **The state of alpha 1- and beta 1-adrenergic reactions upon cold acclimatization (Sostoianie alpha 1- i beta 1-adrenergicheskikh reaktsii pri akklimatsii k kholodu).** V. I. Sobolev and N. Dingamtar (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p. 34-38. 7 refs. In Russian.

Changes in adrenergic mechanisms not connected with thermogenesis which occur upon cold acclimatization are investigated in a study of the reactions mediated by the alpha 1- and beta 1-adrenergic adrenoreceptors in acclimatized rats. Whereas no differences are observed in the quantitative relation between alpha and beta adrenoreceptors in the vas deferens of acclimated and control male rats, acclimatization is observed to increase the affinity of the alpha receptors for nonadrenaline without increasing the maximum possible intensity of the adrenergic process. The prolonged effects of cold are also observed to produce an enhancement in cardiac adrenergic response with an elevation in cardiac affinity for the beta-agonist isadrine. A.L.W.

**A82-26753 †** **Some physiological mechanisms for the effects of the hypothalamus on erythron (O nekotorykh fiziologicheskikh mekhanizmakh vliianiia gipotalamusa na eritron).** O. I. Moiseeva, I. K. Klemina, and V. M. Alekseev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p.39-44. 15 refs. In Russian.

Mechanisms of the influence of hypothalamic activity on circulating erythrocytes, erythrocyte precursors and erythrocyte production are studied in experiments involving the electrical stimulation of various hypothalamic structures of the rabbit. Stimulation of the anterior hypothalamus is found to produce a decrease in blood reticulocyte number and hematocrit, together with a redistribution of intrarenal blood flow indicative of reduced blood supply to the entire renal cortex. Posterior hypothalamic stimulation on the other hand leads to an increase in blood reticulocyte content, and an isolated increase in blood supply to the cortical nephron glomeruli. Changes in plasma erythropoietic activity are not observed. Data suggest hypothalamic effects on hemodynamics, particularly in the blood-forming and erythropoietin-producing organs, as a possible means for the influence of the hypothalamus on erythron. A.L.W.

**A82-26754 †** **Oxygen, carbon dioxide and the calcium control of relaxation mechanisms in cerebral artery smooth muscles (Kislorod, uglekislota i kal'tsievyi kontrol' mekhanizmov rasslableniia v gladkoi muskulature arterii golovnogo mozga).** A. L. Azin (Sverdlovskii Gosudarstvennyi Meditsinskii Institut, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p. 59-63. 19 refs. In Russian.

The role of calcium ion control mechanisms in the relaxation of the smooth muscle cells of the cerebral arteries in response to oxygen insufficiency and excess carbon dioxide is investigated. Experiments were carried out on isolated strips of human internal carotid artery perfused with saline solution at oxygen tensions down to 20 mm Hg and CO2 tensions up to 50-60 mm Hg. Measurements of muscular tonus upon the addition of the inhibitors of cellular calcium exchange verapamyl and manganese ions reveal a complete suppression of the relaxation response to hypoxic and hypercapnic stimuli, while sodium nitrorusside partially maintained the response and intensified the reaction to CO2. Inhibition of the intracellular calcium pump by dichloroxdiphenyltrichloromethyl methane is also observed to reduce the relaxation effect. Results indicate that the responses to both stimuli induce, to different extents, the inhibition of Ca(+2) influx into smooth muscle cells and activate the intracellular calcium pump. A.L.W.

**A82-26755 †** **The effects of systemic arterial and venous pressures on blood volume in the cerebral vessels (Vliianie sistemnogo arterial'nogo i venoznogo davlenii na ob'em krovi v sosudakh golovnogo mozga).** G. I. Mchedlishvili, N. V. Sikharulidze, M. L. Itkis, and S. Januszewski (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR; Polish Academy of Sciences, Experimental and Clinical Medicine Centre, Warsaw, Poland). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p. 64-71. 17 refs. In Russian.

**A82-26756 †** **The role of calcium in the activity of the smooth muscles of the pulmonary veins (Rol' kal'tsiia v deistel'nosti gladkikh nyshts legochnykh ven).** S. V. Molchanov (Sverdlovskii Gosudarstvennyi Meditsinskii Institut, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p. 79-83. 13 refs. In Russian.

**A82-26757 †** **Characteristics of lipid hydrolysis and absorption in rats under motor activity restriction (Osobennosti gidroliza i vsasyvaniia lipidov, u krys pri ogranichenii dvigatel'noi aktivnosti).** K. V. Smirnov, V. S. Nesterenko, I. L. Medkova, and L. V. Koroleva. *Fiziologicheskii Zhurnal SSSR*, vol. 68, Jan. 1982, p. 107-111. 9 refs. In Russian.

Changes in gastrointestinal lipolytic enzyme dynamics, the fundamental bile components involved in lipid transport and processes of fat absorption during hypokinesia are investigated in rats constrained to small volumes for various lengths of time. Analysis of bile composition, pancreatic lipase activities in the blood plasma, pancreas and small intestinal mucosa, monoglyceridlipase activities in the small intestinal mucosa and acid fatty acid absorption reveals the presence of a compensatory adaptive reorganization in cavity and membrane lipid hydrolysis and absorption after 20 and 30 days of motor restriction. Hypokinesia for a greater period of time (60 days) leads to a significant reduction in cavity lipid hydrolysis and the rate of triglyceride absorption. A.L.W.

**A82-26776** **The transfer of failure-detection skills between monitoring and controlling dynamic systems.** C. J. Kessel and C. D. Wickens (Illinois, University, Urbana, IL). *Human Factors*, vol. 24, Feb. 1982, p. 49-60. 21 refs. Contract No. F44620-76-C-0009.

Eighteen subjects either controlled or monitored the system dynamics of a two-dimensional pursuit display. Detection of changes in system dynamics was faster and more accurate when subjects controlled than when they monitored. The skill acquired by controlling transferred positively to the monitoring mode, producing enhanced detection performance. There was no transfer from the monitoring mode to the controlling mode. Monitors of automatic systems who have had prior manual experience rely upon different perceptual cues in making their detection response than do those who have had no experience. The training implications of these findings are discussed. (Author)

**A82-26777** **Pilot judgment - Training and evaluation.** R. S. Jensen (Ohio State University, Columbus, OH). *Human Factors*, vol. 24, Feb. 1982, p. 61-73. 23 refs. FAA-sponsored research.

The possibility of defining, teaching, and evaluating pilot judgment is considered, noting that faulty decision making comprises the cause of over half of all fatal air accidents. Judgment is a term covering a range of activities with spontaneous motor reflexes at one end and cognitive decisions at the other, differing mainly in time to reaction. A definition is offered which includes an information search of all alternatives and making an authoritative choice and subsequent action. Signal detection theory is suggested as a means to improve pilot judgment behavior by separating the stimulus into sensitivity and response modes. Instruction then becomes a period of observing correct decision-making actions by an expert to establish correct levels of sensitivity and response parameters. Methods of computer-assisted training and flight simulation are reviewed, and techniques for standardizing flight judgment evaluations are provided. M.S.K.

**A82-26798 †** **Bioengineering approach to the study of the oculomotor apparatus of the human visual analyzer (Biotekhnicheskii podkhod k issledovaniiu glazodvigatel'nogo apparata zritel'-**

**nogo analizatora cheloveka).** V. F. Ananin. *Problemy Bioniki,* no. 27, 1981, p. 88-93. 9 refs. In Russian.

The human oculomotor system is examined as a biological variant of a multiloop system, in which the regulation of each type of eye movement is accomplished in the frame of its own loop which is autonomous to some degree. Four such loops are postulated: voluntary, voluntary reflexive, involuntary, and tonic. The first three loops are formed by physical messages of nerve impulses, while the tonic loop is formed by a type of innervation. A diagram is presented illustrating the proposed regulation scheme for horizontal eye movements. B.J.

**A82-26799 † Model of the mechanism of the regulation of the human cardiovascular system. I - Concerning the heart-regulation mechanism (Model' mekhnaizma reguliatsii serdechno-sosudistoi sistemy cheloveka. I - O mekhanizme reguliatsii serdtsa).** V. F. Ananin. *Problemy Bioniki,* no. 27, 1981, p. 93-103. 7 refs. In Russian.

The human heart-regulation system is considered as a 10-loop automatic control system. The various loops are associated with intracardiac afferent systems, reflexogenic zones, the sympathetic nervous system, the parasympathetic system, and hormones of the hypothalamo-hypophysial complex. This regulation scheme is found to be suitable for EKG interpretation, where the QRS complex is associated with the ventricles. B.J.

**A82-26812 * Modulation of human sinus node function by systemic hypoxia.** D. L. Eckberg, H. Bastow, III, and A. E. Scruby (U.S. Veterans Administration Medical Center; Virginia, Medical College, Richmond, VA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 570-577. 44 refs. Research supported by the U.S. Veterans Administration and Iowa Lung Association; Grants No. NIH-HL-22546; No. NIH-HL-22296; No. NsG-9063.

The present study was conducted to determine whether bradycardia develops during systemic hypoxia in supine conscious human volunteers when respiratory frequency and tidal volume are maintained at constant levels. The obtained results suggest that mild hypoxia provokes cardioacceleration in humans, independent of changes of ventilation or baroreflex responsiveness. The earliest cardioacceleration is more prominent in the inspiratory than in the expiratory phase of respiration, and occurs with very small reductions of arterial oxygen saturation. Moderate systemic hypoxia dampens fluctuations of heart rate during the respiratory cycle. G.R.

**A82-26813 Effect of breathing patterns on the perceived magnitude of added loads to breathing.** K. J. Killian, E. J. M. Campbell (McMaster University, Hamilton, Ontario, Canada), and D. D. Bucens. *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 578-584. 30 refs. Research supported by the Medical Research Council of Canada.

Recently, studies using open magnitude scaling have shown that the perceived magnitude of externally added loads to breathing follows a predictable relationship in which the psychological magnitude grows as a power function of the added loads. The present investigation has the objective to elucidate the nature of load sensation, taking into account the effects of flow rate, tidal volume, pressure, and inspiratory duration on the perceived magnitude of a range of added resistive and elastic loads to breathing. It is found that the perceived magnitude of externally added loads to breathing is directly dependent on the inspiratory muscle force developed and its duration, and indirectly on the added load. G.R.

**A82-26814 Ventilatory adaptations to resistive loading during wakefulness and non-REM sleep.** C. Iber, A. Berssenbrugge, J. B. Skatrud, and J. A. Dempsey (Wisconsin, University; U.S. Veterans Administration Hospital, Madison, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 607-614. 33 refs. Research sponsored by the U.S. Veterans Administration.

It is pointed out that the interpretation of timing and ventilatory responses to loading during anesthesia may be complicated by alterations in pulmonary and chest wall mechanics. The present study uses, therefore, sleep as a more physiological model for examining load-compensating mechanisms during reduced suprapontine input. The results of the study demonstrate that the ability to defend minute ventilation in response to sustained loading is reduced in sleep as compared to wakefulness and that arousal may be a ventilatory compensation to inspiratory resistance in sleep. G.R.

**A82-26815 Arterial CO2 response to low levels of inspired CO2 in awake beagle dogs.** P. Reischl and D. M. Stevert (California, University, Irvine, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 672-676. 27 refs. Research supported by the Electric Power Research Institute and Southern California Edison Co.

A study conducted by Reischl et al. (1980) has shown that 1% inspired CO2 with a partial pressure of 7 torr administered at sea level to awake beagle dogs results in an increased end-tidal CO2 pressure detectable with repeated measures of end-expiratory CO2. The present investigation extends the work on low-level CO2 inhalation to include arterial blood gases in the trained awake dog with an intact airway and an exteriorized carotid arterial loop. An examination is conducted of the steady-state arterial CO2 pressure during control and 1% CO2 inhalation periods, and results obtained by end-tidal measurements are compared. It is felt that the normal response in dogs to low levels of CO2 inhalation is hypercapnic. None of the various mechanisms which have been proposed to account for the isocapnic response to low levels of CO2 inhalation appears to play a significant role in the present study. G.R.

**A82-26816 * Recovery time course in contractile function of fast and slow skeletal muscle after hindlimb immobilization.** F. A. Witzmann, D. H. Kim, and R. H. Fitts (Marquette University, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 677-682. 30 refs. Grant No. NIH-AM-22037; Contract No. NAS9-15711.

The present study was undertaken to characterize the time course and extent of recovery in the isometric and isotonic contractile properties of fast and slow skeletal muscle following 6 wk of hindlimb immobilization. Female Sprague-Dawley rats were randomly assigned to an immobilized group or a control group. The results of the study show that fast and slow skeletal muscles possess the ability to completely recover normal contractile function following 6 wk of hindlimb immobilization. The rate of recovery is dependent on the fiber type composition of the affected muscle. G.R.

**A82-26817 Respiratory and inert gas exchange during high-frequency ventilation.** H. T. Robertson, R. L. Coffey, T. A. Standaert, and W. E. Truog (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 683-689. 21 refs. Research supported by the University of Washington; Grant No. NIH-HL-06777.

An investigation was conducted to compare inert and respiratory gas exchange during conventional ventilation (CV) and high-frequency ventilation (HFV). The extensive intraregional gas movement which appears to occur during HFV may cause changes in gas exchange efficiency secondary to the properties of the inspired gas mixture. The investigation included, therefore, a study of the influence of alterations in carrier gas density on gas exchange during HFV. Thirteen mongrel dogs were used in the investigation. On the basis of the information obtained in the present study and in other studies of HFV, a number of proposals concerning pulmonary gas exchange are advanced. G.R.

**A82-26818 Thermoregulatory responses in the rat to exercise in the heat following prolonged heat exposure.** R. Francesconi, R. Hubbard, and M. Mager (U.S. Army, Research Institute of Environmental Medicine, Natick, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 734-738. 23 refs.

**A82-26819 Instrumentation simultaneously measuring carbon dioxide excretion and oxygen uptake in humans using titration methods.** C. M. Tsoi, D. B. Raemer, and D. R. Westenskow (Utah, University, Salt Lake City, UT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Mar. 1982, p. 786-791. 10 refs. Grant No. NIH-GM-23095.

Continuous measurement of whole-body metabolism by indirect calorimetry is a useful procedure in intensive clinical medical care and physiological research. Attention is given to an instrument, the Nutrimeter, which combines a technique for oxygen uptake determination using the replenishment principle with the new technique of absorption-titration for carbon dioxide excretion measurement. Measurement of these two parameters combined with an estimate of N2 production makes it possible to conduct indirect calorimetric measurements simply, accurately, and dynamically. A description of the Nutrimeter is provided, and a theoretical analysis of the carbon dioxide excretion measurement technique is performed. G.R.

**A82-26865** **Athermal submillimeter-microwave biological effects.** L. S. Taylor (U.S. Navy, Naval Surface Weapons Center, Silver Spring; Maryland, University, College Park, MD). In: Lasers '80; Proceedings of the International Conference, New Orleans, LA, December 15-19, 1980. McLean, VA, STS Press, 1981, p. 133-136. 18 refs.

There is no argument about the dangers of exposure to high level microwave fields, that is, fields which cause energy absorption rates large compared to metabolic rates. Such fields produce effects, notably cataracts, due to simple heating, by absorption of energy in tissue water molecules. Exposure to high-level fields is relatively rare. In connection with widespread exposure to low-level fields, the possibility has been considered of athermal biological effects due to selective coherent excitation of biological molecules. Questions regarding coherent interactions are investigated, and attention is given to experimental evidence. It is found that athermal biological effects are conceptually possible. Experimental difficulties prevent, however, currently the demonstration of microwave phenomena at the molecular level. G.R.

**A82-26924 *** **Radiographic evidence of disuse osteoporosis in the monkey /M. nemestrina/.** D. R. Young (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) and V. S. Schneider (Public Health Service Hospital, San Francisco, CA). *Calcified Tissue International,* vol. 33, 1981, p. 631-639. 15 refs.

Radiological techniques were utilized for monitoring progressive changes in compact bone in the tibia of monkeys during experimentally induced osteopenia. Bone mass loss in the tibia during restraint was evaluated from radiographs, from bone mineral analysis, and from images reconstructed from gamma ray computerized tomography. The losses during 6 months of restraint tended to occur predominantly in the proximal tibia and were characterized by subperiosteal bone loss, intracortical striations, and scalloped endosteal surfaces. Bone mineral content in the cross section of the tibia declined 17-21%. In 6 months of recovery, the mineral content of the proximal tibia remained depressed. (Author)

**A82-27096 #** **Orientation perception during aircraft coordinated turns.** J. Borah (Gulf and Western Applied Science Laboratories, Waltham, MA) and L. R. Young (MIT, Cambridge, MA). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 20th, Orlando, FL, Jan. 11-14, 1982, Paper 82-0258.* 7 p. 11 refs. Contract No. F33615-78-C-0062.

Effective design of aircraft simulator devices requires an understanding of how aircraft motions are perceived. Perceptual responses previously have not been quantified for several roll maneuvers, including the coordinated turn. Psychophysical measurements of subjective roll and pitch orientation as well as roll angular velocity sensations, in the absence of visual cues, were made during coordinated turns and uncoordinated rolls on the Air Force Total-In-Flight Simulator (TIFS). The pattern of orientation illusions can be explained in terms of the biological sensory mechanisms, and is compared to the predictions of an optimal estimator model for human dynamic spatial orientation. (Author)

**A82-27222 *** **Simplicity in command and control systems - A human factors consideration.** R. L. Chafin (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). In: ITC/USA/'80; Proceedings of the International Telemetering Conference, San Diego, CA, October 14-16, 1980. Research Triangle Park, NC, Instrument Society of America, 1980, p. 519-525. 9 refs. Contract No. NAS7-100.

The importance of simplicity in the man computer interface (MCI) is stressed because of the effect it has on the system containing the MCI. Results are used from an MCI study at the Jet Propulsion Laboratory to find an area where the system MCIs can be simplified. The circumstances under which these simplifications are appropriate are listed. The concepts of cognitive simplicity and process simplicity are presented as design alternatives for the MCI. In addition, the concepts of understandability, operation, learnability, level of learning, and usability are presented as tools for the system designer. The use of these concepts in developing a systematic MCI design is discussed. C.R.

**A82-27503 †** **Scientific-technical and organizational problems of cosmonaut training (Nauchno-tekhnicheskie i organizatsionnye problemy podgotovki kosmonavtov).** G. T. Beregovoi. In: Scientific lectures on aviation and astronautics 1980. Moscow, Izdatel'stvo Nauka, 1981, p. 25-32. In Russian.

The development of cosmonaut training methods at the Gagarin Cosmonaut Training Center is reviewed. Particular consideration is given to flight and parachute training, technical training, and training on complex and specialized simulators. B.J.

**A82-27512 †** **Principal results of medical studies carried out during long-term manned flights in the Salyut 6-Soyuz-Progress orbital complex (Osnovnye rezul'taty meditsinskikh issledovanii, vypolnennykh vo vremia dlitel'nykh pilotiruemykh poletov na orbital'nom komplekse 'Saliut-6'-'Soiuz'-Progress').** O. G. Gazenko and A. D. Egorov. In: Scientific lectures on aviation and astronautics 1980. Moscow, Izdatel'stvo Nauka, 1981, p. 122-136. In Russian.

After a brief review of space medical studies performed over 19 years of manned flight, the paper considers medical studies performed on the Salyut 6-Soyuz-Progress complex during 1977-1979. Methods and results pertaining to the monitoring of cosmonaut health are given; studies of body weight, the cardiovascular system, the motor apparatus, the vestibular functions, the water-salt metabolism, the blood, and biochemical immunological and allergic reactions are examined. Attention is also given to prophylactic measures undertaken against the effects of weightlessness, and to the theory of the adaptation of the human body to space flight. B.J.

**A82-27513 †** **Mode of flight and a mathematical model of pilot activity relating to flight-vehicle control (Obraz poleta i matematicheskaia model' deiatel'nosti letchika po upravleniiu letatel'nym apparatom).** Iu. P. Dobrolenskii, V. A. Ponomarenko, and V. A. Tuvaev. In: Scientific lectures on aviation and astronautics 1980. Moscow, Izdatel'stvo Nauka, 1981, p. 137-140. In Russian.

The possibility of developing a model of pilot control activity that is superior to the transfer-function model is considered. It is shown that such a model can be constructed using the theories of optimal filtering and control and can account for the pilot's acquisition of data from a large number of sensors as well as the characteristic actions of the pilot when he simultaneously controls several control surfaces and the engine thrust. The model is shown to be highly effective despite its complexity. B.J.

**A82-27515 †** **New trends in the development of aerospace medical technology (Novye napravleniia razvitiia aviakosmicheskoi meditsinskoi tekhniki).** R. I. Utiamyshev. In: Scientific lectures on aviation and astronautics 1980. Moscow, Izdatel'stvo Nauka, 1981, p. 161-165. In Russian.

The current status of aerospace medical technology is briefly surveyed. Attention is given to such development trends as the use of microprocessing and macroprocessing, cryogenic equipment, and other advanced techniques. B.J.

**A82-27518 †** **Problems of the development of life support and safety assurance system for space crews (Nekotorye problemy sozdaniia sistem obespecheniia zhiznedeiatel'nosti i bezopasnosti ekipazhei letatel'nykh apparatov).** V. N. Pravetskii, N. M. Samsonov, R. I. Utiamyshev, and E. A. Kurmazenko. In: Scientific lectures on aviation and astronautics 1980. Moscow, Izdatel'stvo Nauka, 1981, p. 180-187. In Russian.

A systems approach is taken to the problem of developing life

support and safety assurance systems for manned space flights of various durations. It is shown that the choice of technological topology for a life support system and the choice of parameters of individual elements optimally effecting the conversion of technological flows can be made only on the basis of a complex examination of the system as a unified whole with allowance for its interaction with the crew, the environment, and other onboard systems. The use of mathematical modeling must be organically combined with other forms of modeling: physical, psychological, or their combinations.
B.J.

**A82-27581 Statistical mechanics of biomembrane phase transition. I - Excluded volume effects of lipid chains in their conformation change.** T. Izuyama and Y. Akutsu (Tokyo, University, Tokyo, Japan). *Physical Society of Japan, Journal,* vol. 51, Jan. 1982, p. 50-58. 16 refs.

**A82-27726 † A bilocal model of a dissipative structure (Bilokal'naia model' dissipativnoi struktury).** A. D. Bazykin and A. I. Khibnik (Akademiia Nauk SSSR, Nauchno-Issledovatel'skii Vychislitel'nyi Tsentr, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 132-136. 7 refs. In Russian.

It is pointed out that the spatial arrangement of ecological systems often derives not so much from the heterogeneity of external nonbiogenic factors as from the mechanics governing the interactions between populations. Research that has been done on dissipative structures with the aid of mathematical and experimental models has shown that the existence of these structures in spatially distributed systems is often linked to self-oscillating patterns in the corresponding local systems. The dissipative structures usually appear when there are pronounced differences between the diffusion coefficients of the components. The relationship between the self-oscillating pattern in a local system and a dissipative structure in a spatially distributed system is investigated using a simple ecological model.
C.R.

**A82-27727 † The interaction of alpha-actinin and tropomyosin with F-actin (Vzaimodeistvie alpha-aktinina i tropomiozina s F-aktinom).** L. A. Tskhovrebova, S. Iu. Khaitlina, N. S. Shelud'ko, and Z. A. Podlubnaia (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino; Akademiia Nauk, SSSR, Institut Biologii Moria, Vladivostok, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 20-25. 29 refs. In Russian.

Characteristics of the interaction of the contractile protein alpha-actinin with F-actin in the presence and absence of tropomyosin are studied in order to determine the localization of alpha-actinin. Interactions of alpha-actinin isolated from the skeletal muscle of a warm-blooded animal (rabbit) and from a cold-blooded animal (scallop) with F-actin and F-actin in the presence of tropomyosin at temperatures of 0 and 37 C were monitored by means of disk electrophoresis, viscosity measurements, and electron microscopy. The temperature dependence of the extent of association of alpha-actinin and tropomyosin with F-actin is found to be similar in both types of alpha-actinin, with an increase in temperature resulting in decreased affinity of alpha-actinin for F actin, and tropomyosin decreasing the amount of alpha-actinin bound at 37 C. At 0 C, actinin and tropomyosin interact independently with F-actin. Data indicate that tropomyosin and alpha-actinin have different binding sites on the F-actin molecule.
A.L.W.

**A82-27728 † Changes in contractile protein composition and properties following space flight (Izmenenie sostava i svoistv sokratitel'nykh belkov posle kosmicheskogo poleta).** V. S. Oganov, S. A. Skuratova, L. M. Murashko, M. A. Shirvinskaia, T. Szilagyi, A. Szoor, M. Rapcsak, O. Takacs, S. S. Oganesian, and Zh. S. Davtian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR; Debreceni Orvostudomanyi Egyetem, Debrecen; Szegedi Orvostudomanyi Egyetem, Szeged, Hungary; Institut Kardiologii, Yerevan, Armenian SSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 26-30. 19 refs. In Russian.

The possible role of changes in the composition and properties of skeletal muscle structural and regulatory proteins in producing the muscle atrophy and contractile changes observed following space flight is investigated in rats flown in the Cosmos 1129 biosatellite. The soleus, extensor digitorum longus, triceps and brachialis muscles were evaluated for isometric tension and analyzed for myofibrillar protein content, catalase activity and troponin-tropomyosin system components. In the post-flight period, muscle capacity to generate force is observed to decrease in all muscles but the extensor digitorum longus. Changes in the relative concentrations of the light chains of myosin and the troponin-tropomyosin system composition are also observed, along with an increase in catalase activity. Results are indicative of a transformation of fiber phenotypes in antigravitational muscles under space flight conditions.
A.L.W.

**A82-27729 † The magnetic susceptibility of rhodopsin (Magnitnaia vospriimchivost' rodopsina).** M. M. Vilenchik (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 31-36. 31 refs. In Russian.

The cooperative interaction with a magnetic field of rhodopsin molecules aligned parallel to each other in the photoreceptor membrane is considered. The anisotropy of the magnetic susceptibility of rhodopsin is calculated, and it is shown that due to this anisotropy and the ordering of rhodopsin molecules in the photoreceptor membrane, the majority of rod outer segments will become oriented along the lines of force of a magnetic field of intensity 80 Oe. Observations of a low velocity for the orientation suggest that it is limited by kinetic constraints. The magnetic effect may be used as the basis for magnetic chemotherapy, in which a magnetic field is used to direct microspheres filled with a bioactive substance, for the inhibition of the growth of malignant tumors, and as an explanation of biological navigation mechanisms.
A.L.W.

**A82-27730 † Antenna form of photosystem-2 chlorophyll in chloroplasts (Antennaia forma khlorofilla fotosistemy II v khloroplastakh).** V. G. Ladygin and K. Ia. Bil' (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 37-41. 15 refs. In Russian.

**A82-27731 † Effect of air ions on the ratio between direct and reverse electron transport in mitochondria under stress (Deistvie aeroinov na sootnoshenie priamogo i obratnogo perenosa elektronov v mitokhondriiakh pri stresse).** M. N. Kondrashova, I. B. Guzar, M. Brechkova, E. B. Okon, and E. V. Grigorenko (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 76-80. 6 refs. In Russian.

Changes in direct (respiration) and reverse (from succinic acid to pyridin nucleotides) energy-dependent electron transport in rat liver mitochondria under stress are found to be mutually opposing. An increase in respiration due to added and, in particular, endogeneous succinic acid is observed, with a corresponding acceleration in phosphorylation. This is accompanied by a weakening of reverse electron transport. Such electron flux redistribution does not involve any coupling loss and represents a physiological mechanism for controlling the ratio between external mitochondria function (ATP synthesis and ion transport) realized by direct electron transport and regenerative synthesis processes involving protons supplied by reverse electron transport. Treatment with air ions after stress reduces the changes described by limiting direct electron transport and stimulating reduction processes associated with reverse electron transport.
V.L.

**A82-27732 † Study of the viscosity of free and protein-bound membrane lipids (Izuchenie viazkosti svobodnykh i sviazannykh s belkom lipidov v membranakh).** I. S. Litvinov and V. V. Obraztsov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 81-86. 16 refs. In Russian.

Temperature effects on the mobility of free and protein-bound lipids in a biological membrane are measured in a study of a possible mechanism for the regulation of membrane-bound enzymes. Lipid viscosity was determined from measurements of pyrene fluorescence intensity upon inductive-resonance energy transfer from tryptophan residues in the membrane proteins of the sarcoplasmic reticulum of rabbit skeletal muscle. Phase transitions in the lipid bilayer and in lipids bound to membrane proteins are found to occur within the same temperature intervals. In the temperature range 10-35 C, the viscosity of lipids in the immediate vicinity of proteins is observed to be greater than that of free lipids, but to become equal to that of the latter at temperatures of 36-39 C. Results suggest the importance of membrane conditions for the optimal functioning of membrane-bound enzymes such as Ca(2+)-ATPase. A.L.W.

**A82-27733** † **Localization of adeninnucleotides in striated fibers of skeletal muscles (O lokalizatsii adeninnukleotidov v poperechnopolosatykh voloknakh skeletnykh myshts).** L. K. Srebnitskaia and A. A. Budnitskii (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 91-94. 9 refs. In Russian.

**A82-27734** † **The possible role of hydrogen bonds in the mechanism of muscular contraction (Vozmozhnaia rol' vodorodnykh sviazei v mekhanizme myshechnogo sokrashcheniia).** K. B. Tolpygo (Akademiia Nauk Ukrainskoi SSR, Fiziko-Tekhnicheskii Institut, Donetsk, Ukrainian SSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 95-98. 11 refs. In Russian.

A model is proposed for the process of energy transfer from ATP to the mechanical work of muscular contraction involving the creation of hydrogen bonds. Based on the observation that the activation energy of hydrogen bonds is comparable with the energy released upon the hydrolysis of ATP, the model states that this energy released goes into the excitation of hydrogen bonds in the actin-myosin system. Such bonds would be strong and far-acting enough to cause the mutual sliding of actin and myosin fibers, thus giving rise to macroscopic muscular contraction. The model allows the evaluation of muscle effort and its dependence on contraction rate and muscle efficiency. A.L.W.

**A82-27735** † **Model of a 'two-headed' myosin cross-bridge and the possibility of its motion in skeletal muscles (Model' 'dvukhgolovogo' miozinovogo mostika i vozmozhnost' ego dvizheniia v skeletnykh myshtsakh).** N. P. Sidorenko (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 99-105. 29 refs. In Russian.

**A82-27736** † **Intracellular local changes in resistance in muscle fibers as a function of membrane potential (Vnutrikletochnye lokal'nye izmeneniia soprotivleniia v myshechnykh voloknakh v zavisimosti ot membrannogo potentsiala).** Iu. A. Trifonov, N. K. Satybaldina, and M. A. Kamenskaia (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 106-110. In Russian.

**A82-27737** † **The accuracy of laser diffraction measurements of sarcomere lengths in contracting muscles (O tochnosti izmereniia dliny sarkomerov sokrashchaiushcheisia myshtsy metodom lazernoi difraktsii).** A. A. Klimov and O. A. Andreev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 111-113. In Russian.

**A82-27738** † **Physical model of the initial stages of energy transformation during oxidative phosphorylation (Fizicheskaia model' nachal'nykh stadii transformatsii energii pri okislitel'nom fosforilirovanii).** D. S. Chernauskii, N. M. Chernavskaia, and L. S. Iaguzhinskii (Akademiia Nauk SSSR, Fizicheskii Institut; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 114-119. 15 refs. In Russian.

A physical model is developed for the coupling of the rapid electron tunneling reaction with the slow process of proton transport from water to the membrane as the initial stage of energy transfer from electron to proton in oxidative phosphorylation. The model is based on the proposal of weak interactions providing the primary electron trap in which an electron would lose an insignificant amount of energy as the time spent in the trap becomes comparable with the proton transport time. The energized proton formed in the protein membrane will thus have sufficient energy for phosphorylation. It is noted that the model applies equally well to chloroplasts and mitochondria. A.L.W.

**A82-27739** † **Study of the initial stage of fibroblast attachment by means of reflective interference microscopy (Izuchenie nachal'noi stadii prikrepleniia fibroblastov metodom otrazhatel'noi interferentsionnoi mikroskopii).** Zh. L. Bliokh, A. E. Platonov, and V. V. Smolianinov (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 120-125. 13 refs. In Russian.

**A82-27740** † **Diffusion model of the dynamics of initial fibroblast attachment (Diffuzionnaia model' dinamiki nachal'nogo prikrepleniia fibroblastov).** A. E. Platonov and V. V. Smolianinov (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 126-131. 5 refs. In Russian.

**A82-27741** † **Properties of stable dissipative structures in mathematical models of morphogenesis (Svoistva ustoichivykh dissipativnykh struktur v matematicheskikh modeliakh morfogeneza).** B. S. Kerner and V. V. Osipov. *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 137-143. 15 refs. In Russian.

The critical selection of a model of morphogenesis or embryogenesis is examined in relation to the properties of corresponding stable dissipative structures. Differences between the stable dissipative structures corresponding to the Turing, Girer, and Meinhard models in one-, two-, and three-dimensional cases are determined. The obtained pattern of dissipative-structure stability is used to investigate organism-shape changes corresponding to various models of morphogenesis in relation to external stimuli. B.J.

**A82-27742** † **Mechanism of the natural oscillations of water metabolism in plants (Mekhanizm avtokolebanii vodnogo obmena v rastenii).** V. G. Karmanov and S. N. Meleshchenko (Agrofizicheskii Nauchno-Issledovatel'skii Institut, Leningrad, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 144-149. 20 refs. In Russian.

**A82-27743** † **The role of membrane structures in the formation of the myofibrillar system in myogenesis (O roli membrannykh struktur v formirovanii miofibrilliarnogo apparata v miogeneze).** Iu. S. Larin, N. V. Samosudova, S. O. Enenko, and V. E. Shungskaia (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 159-162. 7 refs. In Russian.

The determining role of membranes in the formation of the myofibrillar system at different stages of chick-embryo development (on the 8th, 12th, and 15th day) was investigated. At the early stages the myofibrillar assembly depends mainly on the plasma membrane (myofibrils are located beneath the sarcolemma), while later it depends on the developing sarcoplasmic reticulum and T-system. It is shown that transverse tubules invaginating from the plasma membrane are the framework for the forming myofibrillar system, and thin filaments are attached to the transverse tubules at sites of future Z-lines. Destruction of the membrane elements causes disorganization of myofibrillar contractile material. B.J.

**A82-27744** † **Effects of a high-frequency electromagnetic field on tetraphenyl borate transport through bilayer lipid membranes (Vliianie vysokochastotnogo elektromagnitnogo polia na transport tetrafenilborata cherez bisloinye lipidnye membrany).** S. I. Alekseev, V. V. Tiazhelov, L. Kh. Faizova, and V. V. Chertishchev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, Jan.-Feb. 1982, p. 162, 163. 8 refs. In Russian.

The effects of a microwave frequency electromagnetic field on tetraphenyl borate transport through a lipid bilayer membrane are studied taking into account concentrations of the indifferent electrolyte. Experiments were performed using a lecithin membrane with a 10% concentration of cholesterol in an electrolyte solution 0.1-1.6 M in NaCl and 0.00001 M in tetraphenyl borate, irradiated at 0.9 GHz. Increases in membrane saturation current indicative of tetraphenyl borate transport are found upon the activation of the microwave field, with the increase in transport proportional to the NaCl concentration of the solution. Results are attributed to local microwave heating of the electrolyte layers near the membrane.
A.L.W.

**A82-27745** † **NMR-imagery - A new method of biophysical investigation (IaMR-introskopiia - Novyi metod biofizicheskogo issledovaniia).** V. P. Kutyshenko, V. N. Bushuev, and M. S. Okon (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 170-178. 65 refs. In Russian.

The use of NMR techniques to obtain two-dimensional cross-sectional images of biological structures for applications in medical diagnosis is discussed. The fundamental principles of NMR imagery, which detects variations in nuclear density, mobility and magnetic environment, are reviewed, and selected methods currently in use for obtaining proton NMR images reflecting the distribution of free water are examined, including the sensitive points methods, projective image reconstruction, selective excitation, the multiplanar and planar methods, linear scanning, and the echo-planar method. Advantages of specificity, noninvasiveness and the avoidance of ionizing radiation of NMR imagery with respect to other methods of diagnostic imagery are noted, and the potentials of nuclear imagery based on P-31 and F-19 are considered. A.L.W.

**A82-27746** † **Participation of pheophytin in primary electron transfer processes in the reaction centers of photosystem II (Uchastie feofitina v pervichnykh protsessakh perenosa elektrona v reaktsionnykh tsentrakh fotosistemy II).** V. V. Klimov (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, USSR) and A. A. Krasnovskii (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Biofizika,* vol. 27, Jan.-Feb. 1982, p. 179-189. 53 refs. In Russian.

Evidence for the role of pheophytin a, a magnesium-less derivative of chlorophyll, as the primary acceptor of electrons from chlorophyll in the photosystem II reaction centers of green plants is reviewed. Experiments have revealed the reversible photoreduction of pheophytin a in photosystem II preparations in which the presumed primary electron acceptor, designated Q, was reduced in the dark, indicating the function of pheophytin as the primary electron acceptor between the primary electron donor and Q. Further studies of chlorophyll luminescence, the photofilling of long-lived intermediates, pheophytin interactions with reaction system components, oxidation-reduction potentials and charge separation and stabilization in photosystem II reaction centers have demonstrated similarities between the characteristics of green plant photosystem II reaction centers and the reaction centers of purple photosynthetic bacteria. A.L.W.

**A82-27747** † **General characteristics of the development of the body's reaction to external stimuli (Obshchie zakonomernosti razvitiia reaktsii organizma na vneshnie vozdeistviia).** V. I. Kopanev and V. V. Vlasov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1982, p. 44-55. 44 refs. In Russian.

A theoretical study is presented of the dynamic characteristics of the body's reaction to external stimuli of differing intensity. An attempt is made to synthesize data on the dependence of the temporal and quantitative characteristics of the reaction on the stimulus intensity. Individual features of reactivity and resistance are analyzed on the basis of the initial value law. The possibilities of the prognosis of the body's reaction to external stimuli are assessed. B.J.

**A82-27748** † **Hematopoietic tissue development in Japanese quail embryogenesis (Razvitie krovetvornoi tkani v embriogeneze Iaponskogo perepela).** R. V. Latsis and E. I. Deriugina (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 82, Feb. 1982, p. 91-99. 17 refs. In Russian.

**A82-27749** † **Structural and functional organization of the microcirculatory bed in skeletal muscle (Strukturno-funktsional'naia organizatsiia mikrotsirkuliatornogo rusla v skeletnoi myshtse).** V. I. Kozlov, N. D. Vasil'ev, and Zh. T. Iskakova (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 82, Jan. 1982, p. 7-21. 58 refs. In Russian.

The spatial organization of microvessels in skeletal muscle is discussed, and the vascularization of red and white muscle fibers is compared. Data from in vivo microscopy of the spinotrapezius and quadriceps muscles of albino rats is presented which supports the principle of the polymeric homonomic organization of the muscle microcirculatory bed, with the intramuscular angioarchitectonics governed by functional units of the microcirculatory bed designated myoangions. Calculations of capillary bed capacity and reserve potential in white and red muscle fibers based on injection and staining studies show that in the muscle at rest, 40% of the capillaries of the red muscle fibers and 30% of the white muscle fiber capillaries function at any one time. The distribution of the functioning capillaries is also found to ensure optimal muscle metabolism and transorganic circulation reliability. A.L.W.

**A82-27750** † **Mechanisms of the reaction of dividing cells to hypothermia (Mekhanizmy reaktsii deliashchikhsia kletok na gipotermiiu).** I. A. Alov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Sovremennoi Biologii,* vol. 93, Jan.-Feb. 1982, p. 64-72. 75 refs. In Russian.

The effect of cooling on mitosis and its mechanisms is examined. An analysis is presented of mitosis blockade in the methaphase and changes in chromosomes typical for hypothermia, and attention is given to alterations in division associated with the reaction induced by cooling. The restoration of normal mitosis under moderate hypothermia is examined, and possible mechanisms of reversibility are discussed. The role of the activation of the adrenal glands in the depression of mitosis under hypothermia is considered. B.J.

**A82-27751** † **Cerebral hemodynamics in healthy individuals and the recognition of subclinical signs of insufficient blood supply to the brain (Sostoianie tserebral'noi gemodinamiki u zdorovykh liudei i diagnostika subklinicheskikh proiavlenii nedostatochnosti krovosnabzheniia mozga).** V. D. Troshin, E. P. Semenova, and L. L. Kuznetsova (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Koraskova,* vol. 82, no. 1, 1982, p. 12-16. 11 refs. In Russian.

**A82-27752** † **Stenoses of the carotid artery and disorders of the cerebral circulation /clinical and angiographic comparisons/ (Stenozy sonnoi arterii i narusheniia mozgovogo krovoobrashcheniia /kliniko-angiograficheskie sopostavleniia/).** D. N. Dzhibladze and L. K. Bragina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 82, no. 1, 1982, p. 16-23. 28 refs. In Russian.

**A82-27753** † **Bilateral disturbances of the perception function of the brain in patients with unilateral disorders due to acute disturbances of the cerebral circulation (Dvustoronnie narusheniia vosprinimaiushchei funktsii mozga u bol'nykh s odnostoronnim porazheniem vsledstvie ostrogo narusheniia mozgovogo krovoobrashcheniia).** L. I. Sumskii and N. S. Kuksova (Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 82, no. 1, 1982, p. 23-27. 26 refs. In Russian.

**A82-27754** † **Age-related features of blood-coagulation changes in the treatment of cerebral ischemias with indirect-action anticoagulants (Vozrastnye osobennosti izmenenii gemokoaguliatsii pri lechenii tserebral'nykh iskhemii antikoaguliantami nepriamogo deistviia).** E. M. Burtsev and V. V. Shpakh (Irkutskii Institut Usovershenstvovaniia Vrachei, Irkutsk, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 82, no. 1, 1982, p. 32-35. 14 refs. In Russian.

**A82-27755** † **Rheoencephalographic signs of inadequate cerebral blood supply in incipient cerebrovascular insufficiency (O reoentsefalograficheskikh priznakakh nepolnotennosti krovosnabzheniia mozga pri nachal'noi tserebrovaskuliarnoi nedostatochnosti).** N. N. Loginova (Gor'kovskii Meditsinskii Institut, Gorki; Oblastnaia Klinicheskaia Bol'nitsa, USSR). *Zhurnal Nevropatologii i Psikhiatrii im S. S. Korsakova,* vol. 82, no. 1, 1982, p. 47-51. 15 refs. In Russian.

**A82-27756** † **The use of ultrasonic Doppler techniques in the diagnosis of arterial occlusions in the basis cerebri - A Doppler angiography study (Metod ul'trazvukovoi Dopplerografii v diagnostike okkliuziruiushchikh porazhenii arterii osnovaniia mozga - Doppleroangiograficheskoe issledovanie).** Iu. M. Nikitin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 82, no. 1, 1982, p. 36-39. 6 refs. In Russian.

**A82-27757 † The participation of adrenergic mechanisms in microcirculation changes under stress (Uchastie adrenergicheskikh mekhanizmov v izmeneniiakh mikrotsirkuliatsii pri stresse).** M. P. Gorizontova and A. M. Chernukh (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 5-8. 12 refs. In Russian.

Biomicroscopy was employed to investigate microcirculation changes in the mesentery of rats exposed to single or repeated stressors (immobilization or electric stimulation) after adrenalectomy or the administration of adrenoblockers. It is found that catecholamines released from the adrenergic nerve terminals play an important role in microcirculation changes, including the formation of erythrocyte aggregates. These same catecholamines also play an active role in the development of adaptation responses to the repeated stressor effect in the microcirculation system. B.J.

**A82-27758 † The effect of adapting to high-altitude hypoxia on certain indicators of catecholamine metabolism in rats in the case of spontaneous hereditary hypertension (Vliianie adaptatsii k vysotnoi gipoksii na nekotorye pokazatei obmena katekholaminov pri spontannoi nasledstvennoi gipertonii u krys).** N. A. Barbarash, G. Ia. Dvurechenskaia, E. V. Volina, L. V. Berdysheva, T. G. Putintseva, B. N. Manukhin, and F. Z. Meerson (Kemerovskii Meditsinskii Institut, Kemerovo; Akademiia Nauk SSSR, Institut Biologii i Razvitiia; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 22, 23. 10 refs. In Russian.

**A82-27759 † The content of RNA in structures of the autonomic nervous system of rabbits under acute emotional stress (Soderzhanie RNK v strukturakh avtonomnoi nervnoi sistemy krolikov pri ostrom emotsional'nom stresse).** A. V. Gorbunova, S. I. Kashtanov, and V. V. Portugalov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 29-31. 6 refs. In Russian.

**A82-27760 † Ultrasonic method for measuring of hepatic portal blood flow in rats under conditions of contact biomicroscopy (Ul'trazvukovoi metod izmereniia pechenochnogo portal'nogo krvotoka u krys v usloviiakh kontaktnoi biomikroskopii).** N. Ia. Kovalenko and D. D. Matsievskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Feb. 1982, p. 66-68, 122. 5 refs.

A method for measuring the linear and volumetric rate of hepatic portal blood flow in rats is described. The method is based on the application of miniature ultrasonic transducers, contact biomicroscopy of the terminal microvessels of the intestine and liver, and the measurement of the systemic arterial blood pressure. B.J.

**A82-27761 † Mechanism for the antihypoxic effects of depakin (K mekhanizmu antigipoksicheskogo effekta depakina).** R. U. Ostrovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Feb. 1962, p. 42-44. 15 refs. In Russian.

The effects of the antiepileptic depakin (valproate) and other GABA-ergic substances on hypoxia tolerance are investigated. Experiments involved the measurement of survival, cerebral and cardiac lactate and pyruvate levels and the hypoxic lactate excess in mice under conditions of normobaric hypoxic hypoxia, and electrocardiogram changes in rats under hypoxic hypoxia, upon the administration of depakin, the alpha-ketoglutarato GABA transferase inhibitors aminooxyacetic and aminooxybutyric acids and hydroxylamine and the succinic semialdehyde dehydrogenase inhibitor diphenylhydantoin. A dose-dependent effect of depakin in increasing lifetimes, delaying the appearance of rhythm disturbances and preventing lactate accumulation is obtained. The magnitude of the response is similar to that to hydroxybutyrate and succinic semialdehyde, and significantly exceeds that to piracetam, while the succinic semialdehyde dehydrogenase inhibitors elicited no response. Results suggest that the inhibition of succinic semialdehyde dehydrogenase accompanied by the enhanced reduction of succinic semialdehyde plays an important role in the mechanism of action of depakin.

A.L.W.

**A82-27762 † Phosphorylating oxidation during changes in physiological condition (Fosforiliruiushchee okislenie pri izmeneniiakh funktsional'nogo sostoianiia organizma).** T. A. Allik (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fiziko-Tekhnicheskikh i Radiotekhnicheskikh Izmerenii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Feb. 1982, p. 28-30. 14 refs. In Russian.

Changes in the rate of phosphorylating (mitochondrial) and free (microsomal) oxidation with physiological condition ranging from the optimal norm to profound pathology are investigated. Measurements of total and amythal-sensitive respiration were made in rats and mice in physically trained and normal conditions, prepathological conditions of fatigue or early neurosis, pathological conditions of pronounced multiple aseptic inflammation or pronounced neurosis, and prelethal forms of the above pathologies. The trained condition is found to be characterized by a reduced oxygen demand with respect to the norm, which is attributed to a decrease in phosphorylating oxidation. In the prepathological condition, oxygen demand increases, again due to the phosphorylating component, while in pronounced pathology of any etiology phosphorylating oxidation rises further and free oxidation declines sharply. The prelethal condition is characterized by a catastrophic increase in phosphorylating oxidation and a significant increase in total respiration despite a severe reduction in free respiration. A.L.W.

**A82-27763 † Effects of microwaves on acupuncture points under conditions of acute emotional stress in rabbits (Deistvie mikrovoln na biologicheski aktivnye tochki v usloviiakh ostrogo emotsional'nogo stressa u krolikov).** Iu. E. Vagin and S. I. Kashtanov (Akademiia Meditsinskikh Nauk SSSR, and I Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Feb. 1982, p. 21-23. 12 refs. In Russian.

**A82-27764 † Changes in the level of catecholamines in the noradrenaline-synthesizing structures of the rat brain following immobilization (Izmeneniia urovnia katekholaminov v noradrenalinsinteziruiushchikh strukturakh mozga krys posle immobilizatsii).** T. I. Belova, R. Kvetnansky, M. Dobrakovova, I. Ponev, and Z. Oprsalova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Slovenska Akademia Vied, Ustav Eksperimentalnej Endokrinologie, Bratislava, Czechoslovakia). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Feb. 1982, p. 8, 9. 6 refs. In Russian.

**A82-27765 † Effects of acoustic stress on rat sensorimotor cortex morphology (Vliianie akusticheskogo stressa na morfologiiu sensomotornoi kory krys).** N. I. Artiukhina and I. P. Levshina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 98-100. 10 refs. In Russian.

Changes in the structural and ultrastructural characteristics of the rat sensorimotor cortex upon prolonged exposure to high noise levels are examined and compared with corresponding changes in the auditory cortex. Animals were exposed for 14 hours a day to frequencies between 250 and 3500 Hz at an intensity 80 to 90 dB higher than the human audibility threshold for up to 21 days. After 7 days of exposure, focal percapillary hemorrhages are found in the sensorimotor cortex, with microglial cells and fibrous astrocytes accumulated around the site of the hemorrhages. Following longer exposures, fresh hemorrhages are not apparent, and signs of chromatolysis are evident in the neurons and neuroglia. Increases in the numbers of lysosomes containing pigmented granules and the accumulation of a turbid substance in the rough endoplasmic reticulum are also observed. The observations, which represent a more diffuse form of the changes seen in the auditory cortex, may account for the observed disturbances in motor function under conditions of acoustic stress. A.L.W.

**A82-27766 † A study of cerebral microvessels by means of automatic image analysis (Izluchenie mikrososudov mozga metodom avtomaticheskogo analiza izobrazhenii).** V. S. Shinkarenko and V. N. Larina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 3-5. 6 refs. In Russian.

The technique of automatic image analysis is evaluated as a potential means for the study of the quantitative characteristics of the structure of the cerebral microvascular network, a potential indicator of pathological changes. Analysis of histological sections of dog brain with the vascular network filled with ink were performed with a texture analysis system. Measurements of total vascular fragment area, length and number, the area and lengths of fragments of a given diameter, measurement field area, specific vascular length per tissue volume and mean vessel diameter obtained for various areas of the brain by automatic analysis are found to be in general agreement with those obtained by hand, however require considerably less time and manpower than manual methods. A.L.W.

**A82-27767 †** **Regeneration of skeletal muscle after mechanical trauma in reptiles (Regeneratsiia skeletnoi myshtsy posle mekhanicheskoi travmy u reptilii).** I. L. Novoselova, R. P. Zhenevskaia, and M. M. Umova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Jan. 1982, p. 89-91. 15 refs. In Russian.

**A82-27768 †** **Problems of the operational medical in-flight monitoring of pilots (Nekotorye voprosy operativnogo meditsinskogo kontrolia za sostoianiem letchika v polete).** V. V. Litovchenko, I. D. Malinin, and A. Z. Mnatsikan'ian. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 71-73. 15 refs. In Russian.

A brief review is presented of the literature on the use of biotelemetry systems for the operational medical in-flight monitoring of pilots. The characteristics of aviation biotelemetry systems are presented, and future trends in the development of such systems are briefly discussed. B.J.

**A82-27769 †** **The effect of the circadian rhythm of physiological functions on the mental work capacity of operators (K voprosu o vliianii sutochnogo ritma fiziologicheskikh funktsii na umstvennuiu rabotosposobnost' operatorov).** A. N. Popov and V. V. Romanov. *Voenno-Meditsinskii Zhurnal,* Dec. 1981, p. 49-51. 13 refs. In Russian.

Experiments were conducted on persons 19 to 25 years old in order to find a correlation between the circadian rhythm of physiological functions and mental work capacity. It is found that the work of operators with a low circadian amplitude of body temperature tends to be more stable than that of operators with a high circadian amplitude of body temperature. It is recommended that the circadian amplitude of body temperature be used as one of the criteria of the selection of operators for night and shift work. B.J.

**A82-27770 †** **Microionophoretic analysis of the chemical sensitivity of neurons of the medial thalamus and ventromedial hypothalamus to acetylcholine in the case of immobilization-produced emotional stress in rats (Mikroionoforeticheskii analiz khimicheskoi chuvstvitel'nosti neironov medial'nogo talamusa i ventromedial'nogo gipotalamusa k atsetilkholinu pri immobilizatsionnom emotsional'nom stresse u krys).** E. A. Kiiatkin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 32, Jan.-Feb. 1982, p. 136-143. 19 refs. In Russian.

**A82-27771 †** **Daily rhythms of physiological functions during shift work (Sutochnye ritmy fiziologicheskikh funktsii pri smennoi rabote na proizvodstve).** A. A. Sorokin and D. F. Galimova (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* Nov.-Dec. 1981, p. 41-45. 14 refs. In Russian.

The daily rhythms of persons working three shifts in a factory are investigated. It is shown that when cosinor analysis is used to study the daily rhythm it is necessary to take into account not only the circadian rhythm but also the infracircadian rhythm (less than 20 hours). It is suggested that criteria of the optimal organization of shift work be sought on the basis of relationships between circadian and infracircadian rhythms. B.J.

**A82-27772 †** **Adaptive changes in the rat hypophysical-adrenal system upon altitude hypoxia (Adaptivnye izmeneniia gipofizarno-nadpochechnikovio sistemy krys na vysokogornuiu gipoksiiu).** D. Zakirov and E. A. Iangalycheva (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* no. 6, 1981, p. 46-51. 20 refs. In Russian.

A combined biochemical and morphological study is presented of the reactions of the hypophysical-adrenal system during adaptation to altitude hypoxia in rats exposed for various lengths of time to an altitude of 3200 m. Measurements after up to 20 days of exposure reveal increases in the levels of corticosterone and catecholamines in the blood and adrenal glands, indicative of a stress response, followed by decreases in all levels with the exception of blood noradrenalin. A short-term decline in hypophysical ACTH and hypothalamic corticosterone-stimulating activity, followed by an increase and subsequent decrease is also observed. Histological data reveal a significant widening in vascular diameters and increase in nuclear areas in the adrenal cortex and neurohypophysis, which are correlated with variations in alkaline phosphatase and ATPase contents, respectively. Results suggest the enhanced secretion of endogenous vasopressin in the later stages of adaptation accompanied by a decrease in the antidiuretic activity of the hypothalamus. A.L.W.

**A82-27773 †** **Seventy-five days in space (75 sutok v kosmose).** S. D. Grishin and A. D. Egorov. *Zemlia i Vselennaia,* Jan.-Feb. 1982, p. 2-7. In Russian.

Experiments performed on the fifth main flight of Salyut-6 are briefly described. Particular attention is given to the biomedical experiments, which involved the study of adaptation to conditions of weightlessness. The experiments did not reveal any significant alterations in the physiological state of the cosmonauts which could prevent a further increase of space-flight duration. B.J.

**A82-27775 †** **Electroacupuncture in the complex treatment of trifacial neuralgia (Elektroakupunktura v kompleksnom lechenii nevralgii troinichnogo nerva).** E. L. Macheret, I. Z. Samosiuk, V. P. Lysenluk, and L. P. Drigant (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Jan.-Feb. 1982, p. 46-49. 12 refs. In Russian.

**A82-27776 †** **Electromyographic pattern of muscular activity during pushing-off and methods for its directed correction in young ski-jumpers on a trampoline (Elektromiograficheski risunok aktivnosti myshts pri ottalkivanii i puti ego napravlennoi korrektsii u iunykh prygunov na lyzhakh s tramplina).** O. V. Bogdanov, N. M. Iakovleva, A. A. Smetankin, and O. K. Khimich (NIIEM; Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Jan. 1982, p. 35-38. In Russian.

**A82-27777 †** **Effects of increased carbohydrate resources on aerobic work capacity /Carbohydrate loading method/ (Vliianie povysheniia uglevodnyich resoursov na fizicheskuiu aerobnuiu rabotosposobnost' /metod uglevodnogo nasyshcheniia - MUN/).** Ia. M. Kots, L. I. Alikhanova, and O. L. Vinogradova (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1982, p. 20-23. 16 refs. In Russian.

Previous studies have implicated muscle glycogen content as the limiting factor in determining human submaximal aerobic work capacity. The present paper presents a study of the effects of an increase in carbohydrate resources on work capacity during the performance of near-maximal aerobic exercise (80-90% maximal oxygen consumption). Male subjects performed bicycle ergometer exercise at levels of 70%, 80% and 90% of maximal to exhaustion while following a normal mixed dietary regimen, and after a regimen consisting of carbohydrate-poor foods immediately after the exercise period, then three days of carbohydrate-rich foods (carbohydrate loading). The carbohydrate loading regime is found to increase aerobic work capacity at all levels tested, with the amount of increase inversely related to work power. An increase in the total quantity of carbohydrate oxidized during exercise without change in the mean rate of carbohydrate consumption is also observed. A.L.W.

**A82-27778** † **Method for the determination of muscle cross-sectional area and dermato-adipose layer thickness using ultrasonic scanning (Metodika opredeleniia ploshchadi poperechnogo secheniia myshts i tolshchiny kozhno-zhirovogo sloia ul'trazvukovym skanirovaniem).** D. Iu. Bravaia (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1982, p. 25, 26. 10 refs. In Russian.

**A82-27779** † **Effects of periodization in the yearly training cycle on cardiac volume in young athletes (Vliianie periodizatsii v godichnom trenirovochnom tsikle na ob'em serdtsa iunykh sportsmenov).** V. I. Il'nitskii (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Jan. 1982, p. 38, 39. In Russian.

The dependence of the cardiac volume of young athletes of different specializations on their level of training during various phases of the yearly training cycle is investigated. Measurements of cardiac volume were performed by means of biplanar teleradiography during the first and second stages of the preparatory period, the base period and the transitional period in long- and middle-distance runners, short-distance runners and wrestlers aged 13 to 16. Both absolute and relative (with respect to body weight) cardiac volumes are observed to vary in accordance with the stage and type of training, being greater in the endurance-trained athletes. Changes in absolute heart volume are, however, noted to become less marked with age. A.L.W.

**A82-27780** † **A model of the dynamics of athlete condition during the yearly cycle and its role in the management of training (Model' dinamiki sostoianiia sportsmena v godichnom tsikle i ee rol' v upravlenii trenirovochnym protsessom).** Iu. V. Verkhoshanskii, I. N. Mironenko, T. M. Antonova, O. V. Khachatrian, S. V. Nikitin, and A. V. Levchenko (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Jan. 1982, p. 14-19. 8 refs. In Russian.

**A82-27781** † **The determination of overall physical endurance in athletes (Opredelenie obshchei fizicheskoi vynoslivosti u sportsmenov).** Iu. D. Safonov, I. M. Sezin, and V. A. Siluianova (Voronezhskii Meditsinskii Institut, Voronezh; I Moskovskii Meditsinskii Institut, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Jan. 1982, p. 26-28. 7 refs. In Russian.

A method is proposed for the determination of overall physical endurance based in the measurement of a number of cardiorespiratory parameters at rest and during exercise. The parameters employed, respiratory minute volume, oxygen uptake, and the rheographic index, were chosen so as to allow the evaluation of the three fundamental stages of oxygen supply: pulmonary uptake, absorption in the blood, and transport to the tissues. A physical endurance coefficient, defined as a product of the ratios of these parameters recorded at rest and during exercise, allows a distinction to be made between trained and untrained individuals, and among individuals at different levels of training for purposes of monitoring and selection. A.L.W.

**A82-27782** † **The norm and pathology in sports (Norma i patologiia v sporte).** R. E. Motylianskaia (Ministerstvo Zdravookhraneniia RSFSR, Respublikanskii Vrachebno-Fizkul'turnyi Dispanser, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Jan. 1982, p. 24-26. 14 refs. In Russian.

Problems of the assessment of health and pathology in sports medicine are examined. Particular attention is given to the development of an automated method for the statistical prediction of cardiovascular pathology as well as the pathology of other body systems. B.J.

**A82-27783** † **The prognostic significance of electrocardiotopogram parameters in macrofocal myocardial infarction (Prognosticheskoe znachenie pokazatelei elektrokardiotopogrammy pri krupnoochagovom infarkte miokarda).** A. I. Gritsiuk and E. N. Amosova (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Kardiologiia,* vol. 22, Jan. 1982, p. 22-26. 17 refs. In Russian.

**A82-27784** † **Electron-histochemical and functional evaluation of the effects of aspirin on the thrombocytes of healthy people and patients with ischemic heart disease (Elektronnogistokhimicheskaia i funktsional'naia otsenka vliianiia aspirina na trombotsity zdorovykh lits i bol'nykh ishemicheskoi bolezn'iu serdtsa).** V. A. Almazov, V. K. Vashkinel, L. V. Safronnikov, V. A. Lapotnikov, and M. N. Petrov (Ministerstvo Zdravookhraneniia RSFSR, Leningradskii Nauchno-issledovatel'skii Institut Kardiologii, I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Kardiologiia,* vol. 22, Feb. 1982, p. 72-76. 34 refs. In Russian.

**A82-27785** † **Effects of exercise adaptation on the age variation of human cardiac contractile function and left ventricular mass (Vliianie adaptatsii k fizicheskim nagruzkam na vozrastnuiu dinamiku sokratitel'noi funktsii i massy levogo zheludochka serdtsa cheloveka).** F. Z. Meerson and Z. V. Beresneva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, Jan. 1982, p. 85-90. 10 refs. In Russian.

**A82-27786** † **Protective effects of unsaturated fatty acids in adrenaline pulmonary edema and hypobaric hypoxia /The biological significance of catecholamine hyperlipidemia/ (Zashchitnoe deistvie nenasyshchennykh zhirnykh kislot pri adrenalinovom oteke legkikh i gipobaricheskoi gipoksii /K voprosu o biologicheskom znachenii katekholaminovoi giperlipidemii/).** A. Kh. Kogan, L. O. Luk'ianova, and A. N. Kudrin (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1982, p. 50-56. 9 refs. In Russian.

**A82-27787** † **Contribution of the kallikrein-kinin system to microcirculation disorders in the case of immobilization stress (Uchastie kallikrein-kininovoi sistemy v narusheniiakh mikrotsirkuliatsii pri immobilizatsionnom stresse).** M. P. Gorizontova, N. V. Komissarova, and A. M. Chernukh (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1982, p. 7-10. 10 refs. In Russian.

The state of the kallikrein-kinin system (KKS) and the effect of the antikinin agent parmidin and the protease inhibitor trasylol on microcirculation and vascular permeability were studied in the case of immobilization stress in rats. The blood KKS was found to be activated after immobilization for 1, 3, and 24 hours. Parmidin and trasylol improved microcirculation in the mesentery in the case of 1 hour of immobilization and had no appreciable effect on the mesenteric blood flow in the case of 24 hours of immobilization. These agents reduced disorders of vascular permeability caused by immobilization of 1 or 3 hours; in the case of immobilization for 24 hours, only trasylol was effective. B.J.

**A82-27788** † **Central pain mechanisms (Tsentral'nye mekhanizmy boli).** L. N. Smolin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1982, p. 76-82. 100 refs. In Russian.

Malzack and Wall's (1965) gate control theory is examined, and it is shown that, according to this theory, not only the segmentary but also the supraspinal pain-suppression mechanisms are activated exclusively by low-threshold primary afferents. It is argued that this theory has certain defects which cannot be overcome without a radical reworking of the theory. Instead, another theory is proposed, which involves the formation of a 'pain flow' in the spinal cord and the transmission of this flow to the supraspinal structures. B.J.

**A82-27789** † **Complex technique for studying the oxygen regimen and hemodynamics of the oral mucosa under hypoxia (Kompleksnaia metodika izucheniia kislorodnogo rezhima i gemodinamiki v slizistoi obolochke polosti RTA pri gipoksii).** N. K. Loginova and S. I. Vol'vach (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Institut Stomatologii, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1982, p. 67-69. 6 refs. In Russian.

The paper describes a complex rheographic-polarographic instrument for investigating the oxygen regimen and hemodynamics of the oral mucosa under hypoxia. A block diagram of the instrument is presented, and some results obtained with the instrument are discussed. B.J.

A82-27790 † **Mathematical modeling of microhemodynamics in the resistant part of the regional vascular bed (Matematicheskoe modelirovanie mikrogemodinamiki v rezistivnom otdele regionarnogo sosudistogo rusla).** A. M. Chernukh, O. V. Alekseev, B. I. Balanter, and I. M. Mikhailova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1982, p. 64-66. 6 refs. In Russian.

A82-27791 † **Hemodynamics and external respiration in patients with bronchial asthma at rest and during exercise (Gemodinamika i vneshnee dykhanie u bol'nykh bronkhial'noi astmoi v pokoe i pri fizicheskoi nagruzke).** L. L. Orlov, K. A. Memetov, and V. K. Trofimov (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Sovetskaia Meditsina,* no. 1, 1982, p. 19-24. 17 refs. In Russian.

A82-27792 † **Bicycle ergometry in the differential diagnosis of cardialgia (Veloergometriia v differentsial'noi diagnostike kardialgii).** V. M. Sheverda (Vinnitskii Meditsinskii Institut, Vinnitsa, Ukrainian SSR). *Vrachebnoe Delo,* Jan. 1982, p. 54-56. 7 refs. In Russian.

A clinical study involving the use of bicycle ergometry in the diagnosis of cardialgia of different etiologies is presented. The study involved 120 men aged 30 to 50 years, 90 of whom had expressed complaints of pain in the cardiac region. Ergometric testing with concurrent recording of the EKG revealed significant differences between the work capacity, maximum oxygen uptake, oxygen energy equivalent and EKG responses of the control group and the work capacity of all patients, and the maximal oxygen uptake, oxygen energy equivalent and EKG response of patients diagnosed as having chronic coronary insufficiency. Results indicate the effectiveness of ergometry in distinguishing between chronic coronary insufficiency and functional heart diseases in difficult clinical cases.
A.L.W.

A82-27793 † **Incidence of ischemic heart disease and arterial hypertension in sedentary workers (Rasprostranennost' ishemicheskoi bolezni serdtsa i arterial'noi gipertonii u rabotnikov umstvennogo truda).** Iu. I. Kundiev, A. O. Navakatikian, L. I. Tomashevskaia, A. M. Nagornaia, V. V. Kal'nish, and O. P. Petrenko (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Feb. 1982, p. 57-61. 11 refs. In Russian.

A82-27794 † **The combined effects of ionizing radiation and certain other environmental factors /Review of the literature/ (Kombinirovannoe deistvie ioniziruiushchei radiatsii i nekotorykh drugikh faktorov sredy /Obzor literatury/).** L. A. Dobrovol'skii (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Dec. 1981, p. 11-16. 62 refs. In Russian.

Studies of physiological effects on the cellular and tissue levels of ionizing radiation combined with other factors in the environment are reviewed. Attention is given to studies of cell responses to radiation combined with high temperatures and the mechanism of the interaction, skin responses to radiation in the presence of hypothermia, the effects of combined hyperthermia and gamma radiation and of combined microwave and X-ray radiation on survival, and interactions of ionizing radiation with ozone and other products of air radiolysis, and it is pointed out that the additional environmental factors tend to modify the effects of ionizing radiation. Effects of incorporated radionuclides of various energies and distributions within the body in the presence of moderate hyperthermia on the structure and function of the gonads, fertility and future generations are also discussed. A.L.W.

A82-27795 † **Effects of physical factors in the environments on the diurnal and seasonal periodicity of bronchial asthma attacks (Vliianie fizicheskikh faktorov vneshnei sredy na sutochnoe i sezonnoe raspredelenie chastoty pristupov bronkhial'noi astmy).** V. A. Ignat'ev, N. I. Egurnov, and A. N. Lapin (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Pul'monologii, Leningrad, USSR). *Vrachebnoe Delo,* Dec. 1981, p. 71-74. 10 refs. In Russian.

A82-27796 † **Use of a constant magnetic field for the treatment of vibration sickness (Primenenie postoiannogo magnitnogo polia dlia lecheniia vibratsionnoi bolezni).** B. S. Naumenko, G. P. Pidpalyi, and I. S. Starodubtsev (Krivorozhskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Krivoi Rog, Ukrainian SSR). *Vrachebnoe Delo,* Dec. 1981, p. 106-108. 6 refs. In Russian.

Experience in the medical rehabilitation of patients with vibration sickness by the use of a constant magnetic field is reported. Magnetotherapy at a field intensity of 150-200 Oe was used in combination with vitamin therapy in the treatment of 50 miners with stage I vibration sickness, predominantly exhibiting autonomic neuritis, and results of treatment were compared with that of conventional vitamin and sympatolytic, spasmolytic or ganglioblocker treatment of patient controls. As with conventional therapies, the magnetic field is observed to have a positive action on certain nervous system functions, with particularly marked effects on pain, tendon and peristaltic reflexes, peripheral vascular reactivity and rheographic parameters, as well as catecholamine excretion.
A.L.W.

A82-27797 † **Physiological criteria and methods for increasing the effectiveness of correction of hypoxic states (Fiziologichni kriterii i shliakhi pidvishchennia efektivnosti korektsi gipoksichnikh staniv).** M. M. Seredenko, L. I. Zhukovs'kii, V. A. Tsirul'nikov, I. V. Brushko, N. V. Parkhomenko, V. P. Pozharov, K. V. Rozova, and L. D. Fesenko. *Akademiia Nauk Ukrains'koi RSR, Visnik,* Feb. 1982, p. 31-40. 6 refs. In Ukrainian.

A82-27798 † **Development of the hypothesis of the system quantization of behavior with reference to human work activity (Razvitie gipotezy o sistemnom kvantovanii povedeniia na primere proizvodstvennoi deiatel'nosti cheloveka).** G. V. Ryzhikov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 2, 1982, p. 14-17. 7 refs. In Russian.

Anokhin's theory of functional systems is applied to the objective evaluation of the functional state of persons performing monotonous work on a conveyer. Somatovegetative parameters characterizing the attainment of intermediate and end results of work activity were investigated for 72 female workers 18 to 28 years old engaged in the assembly and control of electrooptical systems. In the course of the establishment and sequencing of behavioral acts, the significance of the intermediate results was found to decrease, while that of the end result was found to increase, reflecting the degree to which the work activity was automated and the reduction of the time necessary to achieve the system result. The synchronization between the achievement of intermediate results and the variability of this synchronization between the achievement of intermediate results and the observed somatovegetative alterations and the variability of this synchronization reflected the extent of nervous and emotional tension. B.J.

A82-27799 † **Self-stimulation response as an anti-stress factor in animals (Reaktsiia samorazdrazheniia u zhivotnykh kak antistressornyi faktor).** V. I. Badikov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 2, 1982, p. 69-75. 30 refs. In Russian.

Experimental results are presented on the time variations of cardiac activity and morphological abnormalities in the myocardium of rabbits resulting from daily stimulation for two weeks of negative emotiogenic zones (avoidance behavior) or from alternate stimulation of negative and positive zones (self-stimulation) of the hypothalamus. Particular attention is given to the occurrence of self-stimulation in the presence of subthreshold stimulation of negative emotiogenic hypothalamic zones and after their subsequent exclusion. It is found that there are no simple reciprocal relationships between mechanisms of positive and negative emotional responses. It is concluded that under certain conditions positive emotional states may play the role of an anti-stress factor. B.J.

A82-27800 † **Suction-type EKG electrodes with a remote vacuum pump for stress testing (Prisasyvaiushchiesia EKG-elektrody s vynesennym vakuum-nasosom dlia obsledovaniia pri fizicheskoi**

**nagruzka).** G. P. Kolesova, V. A. Cherniak, V. N. Gedrazhko, and G. F. Mamchenko (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Meditsinskaia Tekhnika,* Jan.-Feb. 1982, p. 44-46. In Russian.

**A82-27801 † The bactericidal activity of various clothing fabrics and dressing materials (Bakteritsidnaia aktivnost' radichnykh tkanei odezhdy i pereviazochnykh materialov).** S. Sh. Umanskii, V. A. Naumov, and Iu. V. Filippovich (Tallinskii Nauchno-Issledovatel'skii Institut Epidemiologii, Mikrobiologii i Gigieny, Tallin, Estonian SSR). *Gigiena i Sanitariia,* Jan. 1982, p. 87, 88. 7 refs. In Russian.

**A82-27802 † Meteorological radars as a source of microwave electromagnetic field energy and questions of environmental health (Meteorologicheskie radiolokatory kak istochnik energii elektromagnitnogo polia sverkhvysokochastotnogo diapazona i voprosy gigieny okruzhaiushchei sredy).** Iu. D. Dumanskii, N. G. Nikitina, L. A. Tomashevskaia, F. R. Kholiavko, K. S. Zhupakhin, and V. A. Iurmanov (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR; Glavnaia Geofizicheskaia Observatoriia, Leningrad; Tsentral'naia Aerologicheskaia Observatoriia, Dolgoprudny, USSR). *Gigiena i Sanitariia,* Feb. 1982, p. 7-11. 6 refs. In Russian.

Consideration is given to the electromagnetic fields found in the vicinity of meteorological radar stations and the significance of these fields to human health. The technical and operating characteristics of the three major types of meteorological radar, intended for use in determining cloud cover, conditions in the free atmosphere and the characteristics of thunderclouds and hail formations, are reviewed, and results of electromagnetic field surveys are presented which indicate meteorological radars to be significant sources of time- and spatially-varying microwave fields. Results of experiments in which rats were exposed to flux densities characteristic of those near meteorological radars (5 to 115 microwatt/sq cm) are indicated which have demonstrated significant changes in sensitivity to electrocutaneous stimulation, static work capacity, conditioned reflex activity as well as enzyme activities and metabolism following chronic exposure at the higher levels. Results thus demonstrate the need for the regulation of radar fields and the development of differentiated population norms. A.L.W.

**A82-27803 † A method for the determination of the antimicrobial activity of clothing fabrics (K metodike opredeleniia antimikrobnoi aktivnosti tkani odezhdy).** Iu. V. Koval'skii and V. P. Padalkin (Vsesoiuznyi Nauchno-Issledovatel'skii Biotekhnicheskii Institut, Moscow, USSR). *Gigiena i Sanitariia,* Jan. 1982, p. 54-56. 6 refs. In Russian.

**A82-27804 † Comprehensive evaluation of the human functional state using ergometry (Kompleksnaia otsenka funktsional'nogo sostoianiia cheloveka pri ergometricheskikh issledovaniiakh).** V. A. Buzunov and V. V. Kal'nish (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Gigiena i Sanitariia,* Jan. 1982, p. 51-54. 10 refs. In Russian.

The paper proposes a method for calculating integral statistical characteristics (the arithmetical mean and the variance) of a set of dimensionless quantities characterizing the human functional state. Results of ergometric studies are presented for healthy and practically healthy persons 20 to 60 years old with reference to a set of physiological indices, including respiration and hemodynamics. B.J.

**A82-27805 † Physiological, hygienic and psychological questions in the adaptation of sailors to conditions of year-round arctic navigation (Fiziologo-gigienicheskie i psikhologicheskie voprosy adaptatsii moriakov v usloviiakh kruglogodovoi arkticheskoi navigatsii).** D. I. Lazarenko, Iu. I. Rezina, S. A. Radzievskii, and S. A. Vinogradov (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Gigiena i Sanitariia,* Jan. 1982, p. 15-17. 6 refs. In Russian.

**A82-27806 † The possibility of maintaining the temperature and work capacity of the extremities (O vozmozhnosti podderzhaniia temperatury i rabotosposobnosti konechnostei).** V. S. Koshcheev, V. I. Makarov, and G. V. Bavro. *Gigiena i Sanitariia,* Feb. 1982, p. 24-26. 6 refs. In Russian.

An experimental study was conducted to study the work capacity and temperature of wrists that were unprotected from cold when the rest of the body was heated. For this purpose, a liquid-heated suit was used, with water being supplied from a temperature of 33 to 47 C, at intervals of 1.5-2 C. It is shown that at a water temperature of 42-43 C it is possible to maintain the wrist temperature at 30 C (if the body is at rest) and to make possible the execution of tasks requiring heightened finger mobility. B.J.

**A82-27807 † A diagram for rapid analysis of albino rat electrocardiograms (Diagramma dlia ekspress-analiza elektrokardiogramm belykh krys).** N. N. Govorunova (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Gigiena i Sanitariia,* Feb. 1982, p. 58. In Russian.

**A82-27808 † Effect of sodium fluoroacetate on oxygen consumption in rat and cat liver tissue and skeletal muscles (Vliianie ftoratsetata natriia na potreblenie kisloroda pechen'iu i skeletnymi myshtsami krys i koshek).** V. A. Artiushkova and V. N. Timeiko (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Voprosy Meditsinskoi Khimii,* vol. 28, Jan.-Feb. 1982, p. 77-81. 18 refs. In Russian.

**A82-27809 † Mathematical modeling and analysis of death dynamics in irradiated mouse populations (Matematicheskoe modelirovanie i raschety dinamiki gibeli populiatsii myshei pod deistviem oblucheniia).** B. I. Rozenfel'd, P. G. But, and V. M. Chibrikin (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Radiobiologiia,* vol. 22, Jan.-Feb. 1982, p. 133-136. 6 refs. In Russian.

**A82-27810 † Microdosimetric analysis of the variability of radiobiological effects in experiments with high-energy radiation (Mikrodozimetricheskii analiz variabel'nosti radiobiologicheskikh effektov v eksperimentakh s vysokoenergeticheskimi izlucheniiami).** I. M. Dmitrievskii, V. I. Ivanov, V. S. Shcheglov, I. G. Akoev, and S. S. Iurov (Moskovskii Inzhenerno-Fizicheskii Institut, Moscow; Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Radiobiologiia,* vol. 22, Jan.-Feb. 1982, p. 88-93. 10 refs. In Russian.

A microdosimetric analysis of received radiation levels has been undertaken in an attempt to account for the observed variability of biological effects in space experiments. Experiments involved the irradiation of T4B bacteriophage with secondary radiation generated by the impact of 70-GeV protons with a target. The survival rates of the various phage ampules are found to follow a log-normal distribution. Results are consistent with a model taking into account spatial fluctuations in local energy absorption resulting from the short interaction lengths of the products of hadronic interactions. A.L.W.

**A82-27811 † The dynamics of rat bone marrow CFUc content during prolonged fractionated irradiation (Dinamika KOEk kostnogo mozga krys v protsesse dlitel'nogo fraktsionirovannogo oblucheniia).** V. M. Luzanov and K. N. Muksinova. *Radiobiologiia,* vol. 22, Jan.-Feb. 1982, p. 44-48. 15 refs. In Russian.

Changes in the levels of granulocyte precursor cells in the bone marrow of rats during prolonged exposure to ionizing radiation are studied. Numbers of colony-forming units in culture (CFUc) in the rat bone marrow were determined by the agar colony method along with myelocaryocyte and leukocyte numbers in rat bone marrow following daily exposure to 0.48 gram-roentgen dose of gamma radiation for up to 60 days. A 15% reduction in femoral CFUc levels is evident following the first irradiation with subsequent doses producing after 5 days a level 12% of that in intact rats. A less marked decrease in the levels of nucleated cells is also found in the first five days of irradiation. Following subsequent irradiation, however, CFUc numbers increased slightly to a final level 74% less than the control, and nucleated cell numbers continued to decline. Leukocyte levels remained at nearly the control values during the entire irradiation period. The decreases in precursor cells are thus concluded to be indicative of disturbances in granulocytopoiesis caused by radiation. A.L.W.

**A82-27812** 1 **Conductors of the airways (Dirizhery vozdushnykh trass).** N. Zykov. *Nauka i Zhizn',* Dec. 1981, p. 58, 59. In Russian.

The profession of air traffic controllers is discussed. The importance of air traffic control in the crowded airspace of today is pointed out, and the duties of the controller are indicated. Attention is also given to the qualifications and training required of an air traffic controller in the Soviet Union. A.L.W.

**A82-28025** **Sleep loss, recovery sleep, and military performance.** D. R. Haslam (Army Personnel Research Establishment, Farnborough, Hants., England). *Ergonomics,* vol. 25, Feb. 1982, p. 163-178. 35 refs.

The results of a sleep-loss followed by rest cycle experiment involving military exercises are reported. The trials comprised 90 hours of wakefulness during tactical field exercises, followed by six days of permitted 4 hr sleep, followed by a 30 hr rest period. Ten infantrymen served as subjects, and were kept constantly occupied during the wakefulness portion of the experiment. Measurements were performed on grouping accuracy during rifle-shooting episodes, and 20 min logical reasoning and 10 min decoding tests were given at 1300, 0100, and 0545 hr every day; EEG recordings were constantly monitored through portable instruments. A decrement of 20% was observed in the grouping accuracy, with recovery occurring on day six and continuing. Results for the logical reasoning tests were higher at 0100 than 1300, although overall scores declined, faster for the decoding test. Any amount of sleep improved the reasoning test performance. Finally, alpha-state increased throughout the sleep-deprived periods, and EEG recordings indicated that sleep deprivation produced traces definable as a need state. M.S.K.

**A82-28094** **How life began.** P. Cloud (Baas-Becking Geobiological Laboratory, Canberra, Australia). *Nature,* vol. 296, Mar. 18, 1982, p. 198, 199.

The discussions that took place at an international symposium in Jindabyne, New South Wales, in December 1981 are summarized. It was pointed out that molecules available as building blocks of life came from (1) chemical evolution in the dark nebulae of the Galaxy; (2) chemical evolution in the presolar nebula followed by the arrival on earth of its products in planetesimal debris; and (3) chemical evolution in the earth's primitive atmosphere and hydrosphere. Considerable attention was given to the origin of replication, with opinion divided on which came first: RNA, DNA, or sugars. It was contended that replication would have been favored by day-to-night temperature variations, and it was shown why chirality may not pose as much of a problem as once supposed. Attention was also given to the earliest known forms of life and to their probable biochemical evolution. C.R.

**A82-28099** **/H-3/-noradrenaline release potentiated in a clonal nerve cell line by low-intensity pulsed magnetic fields.** R. Dixey (St. Bartholomew's Hospital, London, England) and G. Rein (Queen Charlotte's Maternity Hospital, London, England). *Nature,* vol. 296, Mar. 18, 1982, p. 253-256. 25 refs.

**A82-28113** * **Symbiosis in cell evolution: Life and its environment on the early earth.** L. Margulis (Boston University, Boston, MA). Research supported by NASA, Boston University, and California Institute of Technology; Grant No. NGR-22-004-025. San Francisco, W. H. Freeman and Co., 1981. 438 p. 1061 refs. $15.

The book treats cell evolution from the viewpoint of the serial endosymbiosis theory of the origin of organelles. Following a brief outline of the symbiotic theory, which holds that eukaryotes evolved by the association of free-living bacteria with a host prokaryote, the diversity of life is considered, and five kingdoms of organisms are distinguished: the prokaryotic Monera and the eukaryotic Protoctista, Animalia, Fungi and Plantae. Symbiotic and traditional direct filiation theories of cell evolution are compared. Recent observations of cell structure and biochemistry are reviewed in relation to early cell evolution, with attention given to the geological context for the origin of eukaryotic cells, the origin of major bacterial anaerobic pathways, the relationship between aerobic metabolism and atmospheric oxygen, criteria for distinguishing symbiotic organelles from those that originated by differentiation, and the major classes of eukaryotic organelles: mitochondria, cilia, microtubules, the mitotic and meiotic apparatuses, and pastids. Cell evolution during the Phanerozoic is also discussed with emphasis on the effects of life on the biosphere. A.L.W.

**A82-28114** **Multiplication noise in the human visual system at threshold. I - Quantum fluctuations and minimum detectable energy.** M. C. Teich, P. R. Prucnal, G. Vannucci, M. E. Breton, and W. J. McGill (Columbia University, New York, NY). *Optical Society of America, Journal,* vol. 72, Apr. 1982, p. 419-431. 84 refs. Research supported by the National Institutes of Health and NSF.

A series of frequency-of-seeing experiments, similar to those performed by Hecht et al. (1942), was conducted. An Ar(+) laser operated at 514.5 nm was employed as the source of light in the experiments. The present experiments differed from those conducted by Hecht et al. in that high false-report rates were encouraged in certain blocks of trials. A quantitative relationship between the average number of photons required at the cornea, for 60% frequency of seeing, and the false-positive rate demonstrates that sensitivity and reliability are traded against each other over a broad range. A neural-counting model for threshold detection is developed. G.R.

**A82-28115** **Motion and vision. IV - Isotropic and anisotropic spatial responses.** D. H. Kelly (SRI International, Menlo Park, CA). *Optical Society of America, Journal,* vol. 72, Apr. 1982, p. 432-439. 17 refs. Grant No. NIH-EY-01128.

The preceding investigations in this series have dealt with the visual effects of stabilizing the retinal image of a vertical sine-wave grating that either was stationary or was moving at a constant horizontal velocity determined by the experimenter. The present investigation is concerned with a more general class of stimulus patterns which cannot be described as functions of any single Cartesian coordinate. The stabilized thresholds for a number of multicomponent patterns were measured and compared with the corresponding single-component, stabilized thresholds. It is found that, unlike the results with unstabilized patterns, the multicomponent results with stabilized, stationary patterns can be predicted by linear summation of the component contrasts. That is, when more than one component is present, the threshold depends mainly on the total contrast of the stimulus, not on the contrasts of the individual components. G.R.

**A82-28116** **Fading of stabilized retinal images.** U. Tulunay-Keesey (Wisconsin, University, Madison, WI). *Optical Society of America, Journal,* vol. 72, Apr. 1982, p. 440-447. 19 refs. Grants No. NIH-EY-00308; No. NIH-EY-02483.

It is well known that targets whose images are stabilized on the retina by optical means, as well as afterimages that are naturally stabilized on the retina, fade and eventually disappear. Comparative data are presented on the rate of disappearance of stabilized images and afterimages as a function of contrast and spatial frequency. The main finding is that they disappear in a similar fashion only when target contrast is low. (Author)

**A82-28117** **Finding the illuminant direction.** A. P. Pentland (MIT, Cambridge, MA). *Optical Society of America, Journal,* vol. 72, Apr. 1982, p. 448-455. 15 refs.

Shading is important for estimation of three-dimensional shape from the two-dimensional image, for instance, for distinguishing between the smooth occluding contour generated by the edge of a sphere and the shape occluding contour generated by the edge of a disk. In order to use shading information to solve such problems, one must know the illuminant direction L. This is because variations in image intensity (shading) are caused by changes in surface orientation relative to the illuminant. Each illuminant direction L has a unique effect on the distribution of changes in image intensity dI, potentially permitting the estimation of L. However, because dI is a function of both L and the surface curvature, L can be estimated from the image only by making an assumption about the imaged surface curvature. One assumption that is sufficient to disentangle L and surface curvature is that changes in surface orientation are isotropically distributed. This condition is true of images of convex objects bounded by a smooth occluding contour and is true on average over all scenes. Estimates made by using this assumption agree with estimates of illuminant direction given by human subjects for images of natural objects, even when both are objectively wrong. Further, there is a significant correlation between the variance of these estimates and the variance of the human subjects' estimates. (Author)

**A82-28123** **Comparison of flicker-photometric and flicker-threshold spectral sensitivities while the eye is adapted to colored backgrounds.** A. Eisner (Chicago, University, Chicago, IL). *Optical Society of America, Journal,* vol. 72, Apr. 1982, p. 517, 518. 8 refs. Grant No. NIH-EY-01711.

Eisner and MacLeod (1981) have reported that visual sensitivity as measured with flicker photometry on appropriately colored backgrounds is determined predominantly by the response from only one type of cone. The present investigation is concerned with the repetition of the chromatic-adaptation experiments in a modified form. This time the detection of flicker of a fully modulated test is used as a criterion in place of the flicker-photometric null or minimization of flicker. Since flicker thresholds provide an absolute measure of sensitivity and are amenable to a threshold versus intensity treatment, unlike flicker photometry, it is of interest to determine whether the two methods yield the same relative, i.e., spectral sensitivities for a given chromatic adapting field. It is found that there are no significant or systematic differences between the two measures of spectral sensitivity. Flicker photometry is the more precise measure. G.R.

**A82-28218** **Statistical optimization of interaction in man-machine systems.** I. V. Kurochkin and A. A. Mal'tsev. *(Avtomatika i Telemekhanika,* Aug. 1981, p. 35-45.) *Automation and Remote Control,* vol. 42, no. 8, Jan. 10, 1982, pt. 1, p. 1024-1031. 11 refs. Translation.

Statistical optimization of the interaction in a man-machine system is considered on the basis of finding the optimal gains of the actuating and indicating devices as a function of the characteristics of the human operator and the system noise level. It is assumed that the human operator acts like a Kalman filter and within certain limits he can adjust (adapt) his parameters to the parameters of the controlled plant and the environment in accordance with his performance criterion functional; the latter represents the operator's influence on the accuracy of stabilization of the plant coordinate, the intensity of 'his' control action, and the overall energy expenditure of the system on control. An analytic solution is studied, and it is experimentally checked for the problem of statistically optimal interaction between the human operator and a first-order dynamic plant. (Author)

**A82-28227 *** **Amino acid codes in mitochondria as possible clues to primitive codes.** T. H. Jukes (California, University, Berkeley, CA). *Journal of Molecular Evolution,* vol. 18, Dec. 1981, p. 15-17. 15 refs. Grant No. NGR-05-003-460.

Differences between mitochondrial codes and the universal code indicate that an evolutionary simplification has taken place, rather than a return to a more primitive code. However, these differences make it evident that the universal code is not the only code possible, and therefore earlier codes may have differed markedly from the previous code. The present universal code is probably a 'frozen accident.' The change in CUN codons from leucine to threonine (Neurospora vs. yeast mitochondria) indicates that neutral or near-neutral changes occurred in the corresponding proteins when this code change took place, caused presumably by a mutation in a tRNA gene. (Author)

**A82-28228 *** **Molecular relationships between closely related strains and species of nematodes.** M. H. Butler, S. M. Wall, K. R. Luehrsen, G. E. Fox, and R. M. Hecht (Houston, University, Houston, TX). *Journal of Molecular Evolution,* vol. 18, Dec. 1981, p. 18-23. 45 refs. Grant No. PHS-HD-11071; Grant No. NsG-7440.

Electrophoretic comparisons have been made for 24 enzymes in the Bergerac and Bristol strains of Caenorhabditis elegans and the related species, Caenorhabditis briggsae. No variation was detected between the two strains of C. elegans. In contrast, the two species, C. elegans and C. briggsae exhibited electrophoretic differences in 22 of 24 enzymes. A consensus 5S rRNA sequence was determined for C. elegans and found to be identical to that from C. briggsae. By analogy with other species with relatively well established fossil records it can be inferred that the time of divergence between the two nematode species is probably in the tens of millions of years. The limited anatomical evolution during a time period in which proteins undergo extensive changes supports the hypothesis that anatomical evolution is not dependent on overall protein changes. (Author)

**A82-28229 *** **Formation of pyrophosphate, tripolyphosphate, and phosphorylimidazole with the thioester, N, S-diacetylcysteamine, as the condensing agent.** A. L. Weber (Salk Institute for Biological Studies, San Diego, CA). *Journal of Molecular Evolution,* vol. 18, Dec. 1981, p. 24-29. 56 refs. Grant No. NsG-7627.

The formation of pyrophosphate, tripolyphosphate and phosphorylimidazole from orthophosphate in the presence of the thioester N, S-diacetylcysteamine is reported. Reactions performed with 0.20 M orthophosphate and 0.20 M N, S-diacetylcysteamine in 0.40 M imidazole under drying conditions at 50 C yielded pyrophosphate and tripolyphosphate after six days in the presence and absence of divalent metal ions. Reactions carried out at ambient temperature yielded phosphorylimidazole in the presence or absence of 0.06 M MgCl2, phosphorylimidazole and pyrophosphate in the presence of 0.05 M CaCl2, and pyrophosphate and tripolyphosphate in the presence of 0.15 M CaCl2. Such reactions represent potential pathways for the formation of energy-rich compounds providing free energy for use in prebiotic biopolymer synthesis. A.L.W.

**A82-28230** **Comparative biosequence metrics.** T. F. Smith (Northern Michigan University, Marquette, MI), M. S. Waterman (Los Alamos National Laboratory, Los Alamos, NM), and W. M. Fitch (Wisconsin, University, Madison, WI). *Journal of Molecular Evolution,* vol. 18, Dec. 1981, p. 38-46. 15 refs. NSF Grant No. DEB-78-14197.

A comparison is presented of the algorithms of Needleman and Wunsch (1970) and of Sellers (1974) for comparing unaligned macromolecular sequences in order to obtain a measure of their evolutionary relatedness. The Needleman-Wunsch algorithm is shown to result in alignments having a maximum similarity measure, while the Sellers algorithm results in alignments having a minimal distance or dissimilarity measure. The algorithms are equivalent, however, and give the same results under the conditions that the weight assigned to gaps in the Sellers algorithm exceeds that in the Needleman-Wunsch algorithm by the product of half the gap length with the maximum match value, and the sum of the respective degrees of similarity and dissimilarity equals a constant. Applications of the two algorithms to studies of sequences incorporating functionally aligned elements are illustrated, and it is noted that the algorithms may be used to align anything from geological sequences to protein amino acids. A.L.W.

**A82-28231 *** **The current status of REH theory.** R. Holmquist and T. H. Jukes (California, University, Berkeley, CA). *Journal of Molecular Evolution,* vol. 18, Dec. 1981, p. 47-59; Reply, p. 60-67. 70 refs. Grant No. NGR-05-003-460.

A response is made to the evaluation of Fitch (1980) of REH (random evolutionary hits) theory for the evolutionary divergence of proteins and nucleic acids. Correct calculations for the beta hemoglobin mRNAs of the human, mouse and rabbit in the absence and presence of selective constraints are summarized, and it is shown that the alternative evolutionary analysis of Fitch underestimates the total fixed mutations. It is further shown that the model used by Fitch to test for the completeness of the count of total base substitutions is in fact a variant of REH theory. Considerations of the variance inherent in evolutionary estimations are also presented which show the REH model to produce no more variance than other evolutionary models. In the reply, it is argued that, despite the objections raised, REH theory applied to proteins gives inaccurate estimates of total gene substitutions. It is further contended that REH theory developed for nucleic sequences suffers from problems relating to the frequency of nucleotide substitutions, the identity of the codons accepting silent and amino acid-changing substitutions, and estimate uncertainties. A.L.W.

**A82-28260** **Oculoparalytic illusion - Visual-field dependent spatial mislocalizations by humans partially paralyzed with curare.** L. Matin, E. Picoult, D. Young, R. MacArthur (Columbia University, New York, NY), J. K. Stevens (Toronto, University, Toronto, Canada), and M. W. Edwards, Jr. (Pennsylvania, University, Philadelphia, PA). *Science,* vol. 216, Apr. 9, 1982, p. 198-201. 12 refs. Grant No. NIH-EY-03198; Contract No. N62269-80-C-0298.

In darkness, observers partially paralyzed with curare make large (greater than 20 deg) gaze- and dosage-dependent errors in visually localizing eye-level horizontal and median planes, in matching the location of a sound to a light, and in pointing at a light. In illuminated, structured visual fields, visual localization and pointing are accurate but errors in auditory-to-visual matches remain. Defects in extraretinal eye position information are responsible for all errors. The influence of extraretinal eye position information on visual localization is suppressed by a structured visual field but is crucial both in darkness and for intersensory localization if visual capture is prevented. (Author)

**A82-28284** **Basic nitrogen-heterocyclic compounds in the Murchison meteorite.** P. G. Stoks and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Geochimica et Cosmochimica Acta,* vol. 46, Mar. 1982, p. 309-315. 29 refs.

A fragment of the Murchison (C2) carbonaceous meteorite was analyzed for basic, N-heterocyclic compounds, by dual detector capillary gas chromatography as well as capillary gas chromatography/mass spectrometry, using two columns of different polarity. In the formic acid extract 2, 4, 6-trimethylpyridine, quinoline, isoquinoline, 2-methylquinoline and 4-methylquinoline were positively identified. In addition, a suite of alkylpyridines and quinolines and/or isoquinolines was tentatively identified from their mass spectra. The (iso)quinolines are found to contain methyl substituents exclusively. The distribution of the pyridines observed reveals a similarity to that observed from catalytic reactions of ammonia and simple aldehydes under conditions similar to those applied in Fischer-Tropsch reactions. (Author)

**A82-28393** # **Design and validation of a tracking test for forming matched groups for continuous tracking experiments.** F. D. Pitrella and W. Krüger. Wachtberg-Werthhoven, West Germany, Forschungsinstitut für Anthropotechnik (Forschungsinstitut für Anthropotechnik, Bericht, No. 49), 1981. 29 p. 22 refs.

Questions regarding the appropriate selection of an experimental design are examined, taking into account within-subject designs, hybrid designs, and between-subject designs. The selection of a criterion task and the selection of a matching test control device are discussed, and a description is presented of the procedure employed to validate a matching test. A pilot experiment is considered along with validation experiments, questions of predictive validity, and aspects of matching validity. A data analysis is conducted, giving attention to test reliability data, the performance degradation problem, the selection of the correlation coefficient, and the validation coefficients. Validation coefficients for low error half blocks and high error half blocks are listed in tables. G.R.

**A82-28394** # **The evaluation of information display on the basis of the transinformation (Die Bewertung von Anzeigen durch den Transinformationsfluss).** K. R. Kimmel. Wachtberg-Werthhoven, West Germany, Forschungsinstitut für Anthropotechnik (Forschungsinstitut für Anthropotechnik, Bericht, No. 52), 1981. 86 p. 92 refs. In German.

Investigations in the area of human engineering require, in addition to mathematical models describing the activities of man, also suitable parameters for an evaluation of the relevant ergonomic performance quantities. The present investigation is concerned with a comparison of two evaluative criteria, including the rms control error and the transinformation. The rms control error provides a measure concerning the control performance obtained for various parameter configurations. The parameter 'transinformation' can be used as a measure with respect to the capability of man to function as an information-processing system in connection with the performance of a control task. An understanding of a part of the arising transinformation-related effects could be obtained on the basis of theoretical considerations. The superiority of transinformation as a measure was found to be ultimately based on a greater general validity and the dimensionless properties. G.R.

**A82-28453** † **Tissue chemoreceptors (Tkanevye khemoretseptory).** V. A. Lebedeva, L. V. Filippova, T. N. Bratus', and V. N. Iartsev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 137-149. 36 refs. In Russian.

Results of studies conducted over the past 25 years on the role of tissue chemoreceptors in the reflex regulation of cardiovascular and respiratory activity are reviewed. Experimental modifications of the acid-base balance of the cat small intestine by perfusion or the administration of acid are presented which have shown an increase in mesenteric nerve firing and elevation of systemic arterial pressure upon induced acid concentrations within the normal range, with a greater sensitivity to metabolic than respiratory acidosis. Further studies have shown the skeletal muscle chemoreceptors to be less sensitive than the small intestine chemoreceptors, although thresholds for stimulation were still in the physiological range, and have demonstrated a possible action of the small intestine chemoreceptors in the reflex regulation of respiration. Results are noted to support the view of Chernigovskii concerning the role of the tissue chemoreceptors in providing the central nervous system with information on the rate of tissue metabolism. A.L.W.

**A82-28454** † **Trace reactions and the ambient temperature (Sledovye reaktsii i temperatura sredy).** A. D. Slonim (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 172-176. 45 refs. In Russian.

Experimental data concerning thermoregulatory trace reactions on the organismal, organ and tissue levels in response to the effects of ambient temperatures is discussed. Observations have allowed three major types of reaction to be distinguished: adaptation upon continuous or intermittent exposure to temperature, the formation of a conditioned thermoregulatory reflex, and habituation following either single or repeated thermal stimuli. Reactions on the cellular and tissue levels are observed within 6 to 24 hours of the thermal stimulus, while reactions on the level of the entire organism form after 5 days of high-intensity intermittent exposure and persist for up to 30. The traces may be maintained after prolonged and repeated exposures for periods of months or even years, combining with natural physiological rhythms. The effects of thermal stimuli are observed to be greatest in the regulatory systems, and in complex behavioral acts, and lesser in effector systems and in the more simple behaviors. A.L.W.

**A82-28455** † **Some neurophysiological correlates of visual perception (O nekotorykh neirofiziologicheskikh korreliatakh zritel'nogo vospriiatiia).** V. D. Glezer (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 220-228. 33 refs. In Russian.

The role of the spatial frequency filter receptor fields of the visual cortex in shape and image perception is discussed on the basis of an examination of the structural organization of the simple and complex receptor fields of the visual cortex. The two dimensional weighting function determining the spatial frequency and orientation sensitivity of the spatial frequency filter is analyzed. Two types of modules, cortical neuron cylinders with overlapping visual fields but tuned to different spatial frequencies and orientations, are considered: those containing neurons which give a Fourier description of image portions and those which provide a power spectrum, which are suggested to function in texture description. Receptive field inhibition by side frequencies of the optimal frequency and orientations perpendicular to the optimal orientation is taken as evidence of the mutual inhibition of module neurons. A.L.W.

**A82-28456** † **Some mechanisms of central inhibition (O nekotorykh mekhanizmakh tsentral'nogo tormozheniia).** A. B. Kogan (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 256-262. 28 refs. In Russian.

The organization of the various complex processes of central inhibition, by which the central nervous system takes part in the organization, fine-structure specification and space-time determination of any nervous act, is discussed. On the neuronal level, inhibition is shown to be expressed by the reorganization of subcellular elements, while at the level of nerve centers it is achieved by the patterns of inhibited and excited neurons and at the level of systems of nervous activity by the hierarchical relations of interacting nervous centers. It is noted, however, that at all levels inhibition or excitation is organized according to the specific space-time distribution of the activities of the components in question. A.L.W.

**A82-28457** † **The contribution of V. N. Chernigovskii to the development of diving physiology and medicine (Vklad V. N. Chernigovskogo v razvitie vodolaznoi fiziologii i meditsiny).** I. A. Sapov. *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 263-266. 16 refs. In Russian.

Work done by V. N. Chernigovskii in the field of diving physiology and medicine during his tenure at the Soviet Naval Medical Academy and the Standing Commission on Underwater Physiology and Medicine of the Presidium of the Soviet Academy of Sciences is reviewed. His major contributions were in the organization of fundamental studies of physiological reactions to elevated pressures and the occupational pathology of divers, and the planning, interpretation and generalization of the results of fundamental and practical investigations covering a wide range of subjects in the physiology and medicine of diving. A.L.W.

**A82-28458** † **Mechanisms for the adaptive and trophic effects of the sympathetic nervous system on cerebral vessels and tissue (Mekhanizmy adaptatsionno-troficheskikh vliianii simpaticheskoi nervnoi sistemy na sosudy i tkan' golovnogo mozga).** S. I. Teplov (Leningradskii Neirokhirurgicheskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 275-283. 19 refs. In Russian.

The adaptive and trophic role of sympathetic innervation is studied in experiments on the immediate and delayed effects of cervical sympathectomy and postganglionic fiber stimulation on cerebral blood flow, hypothalamic neurosecretion and cerebral metabolism. Acute experiments on cats have revealed the adaptive functioning of the sympathetic innervation of cerebral vessels during rapid changes in systemic arterial pressure by rapid autoregulation and the maintenance of the blood-brain barrier, as well as the dependence of the circulatory effects of desympathetization on basal vascular tonus. The delayed effects of sympathetic excitation, vasoconstriction and edema, are found to depend on vasopressin secretion. Biochemical investigations on rats also demonstrated changes in ATPase activity, oxidation and phosphorylation rates, cAMP cGMP and prostaglandin concentrations following cervical desympathetization and cerebral ischemia. Results have significance for the understanding of brain compensatory mechanisms for hypoxia and other damaging factors. A.L.W.

**A82-28459** † **The information content of indicators of cerebral vascular responses to adequate influences (Ob informativnosti pokazatelei reaktsii mozgovykh sosudov na adekvatnye vozdeistviia).** Iu. E. Moskalenko, V. A. Khil'ko, G. B. Vainshtein, D. Kh. Gardovska, V. N. Semernia, B. V. Gaidar, and E. S. Hurguzhaev (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR; Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Feb. 1982, p. 284-292. 8 refs. In Russian.

Possible indicators of cerebral vascular reactivity to adequate biomechanical effects are evaluated for their information content in the assessment of the physiological condition of cerebral circulatory regulation. Experiments involved the measurement of the level of cerebral blood flow, intracranial pressure, and cerebral blood-filling dynamics as well as central hemodynamic parameters in animals, healthy people including children of various ages and surgical patients with craniocerebral traumas under normal conditions and during the performance of the Valsalva, Queckenstedt, Stukkey and orthostatic tests. Changes in the levels of all the parameters measured during hemodynamic and liquorodynamic stresses are found to depend on the physiological condition of the organism, indicating that they may be used to provide objective criteria for the evaluation of the activity of regulatory processes in cerebral circulation. A.L.W.

**A82-28478** **The extraction and identification of drugs in aviation toxicology.** R. W. Mayes (RAF, Institute of Pathology and Tropical Medicine, Halton, Bucks., England). *(Joint Committee on Aviation Pathology Scientific Session, 12th, Aylesbury, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 332-335. 6 refs.

The drug screen as used in Aviation Pathology is unique in toxicological analysis in that it seeks to identify the whole range of clinical drugs at or below therapeutic levels. Recently the introduction of proteolytic enzymes has enabled more efficient extraction of drugs from tissues. The measurement of the Gas Chromatographic Retention Index can provide an important parameter in the identification of drug substances. (Author)

**A82-28479** **G stress on A-10 pilots during JAWS II exercises.** K. K. Gillingham, D. L. Makalous, and M. A. Tays (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 336-341. 9 refs.

It had been found that the jinking maneuvers employed by A-10 pilots to deprive the enemy of a readily trackable target resulted in a nearly constant exposure to moderate levels of G stress, with frequent excursions to relatively high G levels. The present investigation is, therefore, concerned with the contribution of G stress to fatigue experienced by pilots in connection with A-10 operations. Continuous time records of +G load on the aircraft were obtained on eight sorties with an Inflight Physiological Data Acquisition System module. It was found that defensive jinking maneuvers during combat necessitates numerous short exposures to G level in the 4-7 G range, but acute symptoms of G intolerance in A-10 pilots are nearly nonexistent. Repetitiveness of G exposure may contribute to pilot fatigue. However, the problem of task saturation is of far greater importance to the pilot than G stress. G.R.

**A82-28480** **Altitude and hypoxia as phase shift inducers.** I. E. Ashkenazi, J. Ribak, D. M. Avgar, and A. Klepfish (Tel Aviv University, Tel Aviv; Israel Air Force, Aeromedical Centre, Israel). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 342-346. 18 refs.

Experimental results to determine if an unnatural mechanism could be introduced so that circadian rhythm shifts could be accomplished abruptly, rather than over an adaptive period, are reported. Two females and one male practiced questionnaires and performance tests, maintained the same waking/rest cycles, and ate the same food for a week. Subsequent exposure to atmospheric pressure reduction and hypoxia in a flight simulator were followed by medical tests and performance of perceptual, recognition, and cognitive tests, and performance was tracked for 24 hr diurnal rhythms in performance ability. The tests were repeated for 6 days. The test results indicated a circadian rhythm phase shift immediately after exposure to simulated flight, which led to postulation of two kinds of biological synchronizers. One controls a slow adaptation to changes in the temporal order, letting each receptor (oscillator) in the body react in its own time, while a second mechanism reacts to alien cues not experienced by evolution, and which induces all receptors to react as one. M.S.K.

**A82-28481** **Evidence for the involvement of central alpha2 mechanisms in intrathoracic volume expansion-induced diuresis - A study with clonidine and propranolol.** P. Montastruc, J.-L. Montastruc, and L. D. Tran (Toulouse III, Université, Toulouse, France). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 347-353. 17 refs.

The inhibition of diuresis through use of clonidine, an alpha2-adrenergic agonist, induced by a rise in intrathoracic plasma volume in dogs was studied to define the role of alpha2 adrenoreceptors. Thirty anesthetized dogs were monitored for blood pressure, heart rate, respiratory frequency, and urinary volume, while the lungs were connected to a spirometer after tracheotomy. An incision was made in the fourth left intercostal space in order to insert a balloon into the left atrium, followed by inflation of the balloon with water. The dogs were exposed to negative pressure breathing for 30 min/hr. An intravenous or intracisternal clonidine injection inhibited the diuretic response to negative pressure breathing and left atrial distension. Intravenous yohimbine opposed the effects of the clonidine. The results indicated that the adrenergic receptor associated with the volumetric control of vasopressin secretion is an alpha2 subtype. M.S.K.

**A82-28482** **Ventilation and acid-base equilibrium for upper body and lower body exercise.** M. N. Sawka, D. S. Miles, J. S. Petrofsky, S. W. Wilde, and R. M. Glaser (Wright State University;

U.S. Veterans Administration Medical Center, Dayton, OH). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 354-359. 35 refs. Research supported by the U.S. Veterans Administration; Grant No. NIH-7-RO1-NS-16003-01; Contract No. F33615-78-C-0501.

Results of a comparison of pulmonary ventilation and blood acid-base responses of humans during arm crank and cycle ergometer exercise at various metabolic intensities are reported. Nine male subjects were monitored on ECG, cardiotachometer, spirometer, and gasometer, in addition to measurements of blood pH and flow, respiration rate, and alveolar ventilation. Oxygen uptake, pulmonary ventilation, alveolar ventilation and blood lactate values increased during submaximal exercise, and were lower in arm crank than in cycle ergometer maximal exercise. However, further investigation of the measured values in relation to peak oxygen uptake revealed identical response patterns, implying that the pulmonary ventilation and blood acid-base responses are more dependent on the relative exercise intensity than on the muscle groups employed. M.S.K.

**A82-28483** **Effect of flight on the Eustachian tube function and the tympanic membrane system - A follow-up study.** P. Groth, A. Ivarsson, and O. Tjernstrom (Lund, Universitet, Lund; Malmo General Hospital, Malmo, Sweden). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 360-364. 17 refs.

The Eustachian tube function in 32 aviation trainees was comprehensively tested in simulated flights in a pressure chamber on three occasions during their training. Their mean flight experience between tests comprised 150 h in jet training planes and 260 h in jet fighters. Their capacity to clear the ears in descent did not improve convincingly between tests, but the pressure opening level in ascent was significantly lowered. The elasticity of the eardrum system was significantly increased. The results suggest that the first test, before the flight training, is reliable for selection purposes. Reasons for difficulties in finding good agreement between test results and results of actual flight training are discussed. (Author)

**A82-28484** **The strength-endurance relationship in skeletal muscle - Its application to helmet design.** J. S. Petrofsky and C. A. Phillips (Wright State University, Dayton, OH). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 365-369. 17 refs. Grant No. DAMD17-80-C-0069.

The isometric strength and endurance of the neck muscles in man was measured in four male subjects during dorsal, ventral, and lateral flexion of the head in a helmet dynamometer. The purpose of these experiments was to quantify the maximum strength of the neck muscles in these directions and to examine the relationship between isometric strength and endurance for various submaximal isometric tensions. Isometric contractions were sustained to fatigue by these subjects at tensions of 25, 40, 55, 70, and 90% of the maximum isometric strength in each of the directions of movement. Generally, the endurance of the muscles involved in ventral flexion was less than that found in dorsal and lateral flexion of the head. However, the strength of the muscles involved was progressively greater for lateral, dorsal, and ventral flexion, respectively. The implication of these findings in helmet design and helmet loading are discussed. (Author)

**A82-28485** **Effects of space flight factors at the cellular level - Results of the Cytos experiment.** H. Planel, R. Tixador, Iu. Nefedov, G. Grechko, and G. Richoilley (Toulouse III, Université, Toulouse, France; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 370-374. 20 refs.

Paramecium tetraurelia was cultivated aboard the Soviet orbital station Salyut 6. Each culture included one cell, bacterized culture medium, and two small glass tubes filled with a fixative. Cultures were kept at a low temperature before Soyuz-Salyut docking. Cultures were maintained at 25 plus or minus 0.1 C in orbit and were fixed every 12 h. The space flight resulted in an increase in cell growth rate and in cell volume. Measurements of cell dry weight and total protein content favor a higher cell water content. Respective roles of cosmic rays and microgravity are discussed. Cytos results are compared to those of previous space experiments. (Author)

**A82-28486 *** **A practical ultrasonic plethysmograph.** V. C. Wu, W. T. Nickell, and P. K. Bhagat (Kentucky, University, Lexington, KY). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 375-378. 9 refs. Contract No. NAS9-15452.

An ultrasonic plethysmograph, which gives improved performance over the standard Whitney Strain Gauge, is described. This instrument monitors dimension changes in human limbs by measuring the transit times of acoustic pulses across two chords of the limb. In the case of a small uniform expansion, the percentage change in limb volume is shown to be proportional to twice the percentage change in either of the measured chords. Measurement of two chords allows correction for possible non-uniform expansion. In addition, measurement of two chords allows an estimate of the absolute cross-sectional area of the limb. The developed instrument incorporates a microprocessor, which performs necessary calculation and control functions. Use of the microprocessor allows the instrument to be self-calibrating. In addition, the device can be easily reprogrammed to incorporate improvements in operating features or computational schemes. (Author)

**A82-28487** **Relationship of personality factors and some social habits to cardiovascular risk in submariners.** D. V. Tappan and B. B. Weybrew (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, CT). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 379-389. 34 refs.

**A82-28488** **Post-acceleration chaotic atrial rhythm.** J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 390-392. 11 refs.

Chaotic atrial rhythm has traditionally been a dysrhythmia of the seriously ill elderly patient and commonly associated with pulmonary disease. It has been reported less frequently in young individuals with and without pulmonary disease. An apparently healthy asymptomatic centrifuge subject had reproducible episodes of chaotic atrial rhythm only in the recovery period after exhaustive +G2 simulated aerial combat maneuvering. The underlying mechanism responsible for initiation of chaotic atrial rhythm is unknown, but may be related to distension of atrial tissue. In lung disease with attendant pulmonary hypertension or post +G2 stress with the sudden increase in venous return, the necessary distension of the right atrium can be induced. The prognosis of individuals with chaotic atrial rhythm depends on the severity of the underlying illness and is probably benign in apparently healthy asymptomatic individuals with normal cardiovascular evaluation. (Author)

**A82-28489** **Airline pilot disability - Economic impact of an airline preventive medicine program.** R. Anderson (Air Canada, Montreal, Canada) and C. C. Gullett (Harvey W. Watt and Co., Atlanta, GA). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 393-402.

The current economic crisis facing most major United States airlines has forced a close examination of airline-sponsored activities. The effectiveness of one airline's pilot preventive medicine program was estimated by comparing disability experience of its pilots against the experience of a larger population of airline pilots. The preventive medicine program at the studied airline was shown to reduce disability experience by one-third, while saving the airline better than $6 million annually. This program yielded the airlines better than a 6-1 return on investment during the years studied. (Author)

**A82-28490** **Beta adrenergic blocking agents to control hypertension in aviation personnel.** C. L. Schamroth, R. Davidoff, J. M. Schamroth, and D. P. Myburgh (Institute for Aviation Medicine, Pretoria, Republic of South Africa). *Aviation, Space, and Environmental Medicine,* vol. 53, Apr. 1982, p. 403, 404. 6 refs.

Beta adrenergic receptor blocking agents were used in the treatment of 15 hypertensive aircrew who had failed to respond to thiazide diuretics. Atenolol (Tenormin) resulted in adequate control of blood pressure in all subjects. Side effects were minimal and insignificant. It is recommended that a cardio-selective, water-soluble beta blocker, such as atenolol, be made available to selected hypertensive aircrew. (Author)

**A82-28600** **Evidence for a boundary effect in roll vection.** J. T. Reason, A. R. Mayes, and D. Dewhurst (Manchester, Victoria University, Manchester, England). *Perception and Psychophysics,* vol. 31, no. 2, Feb. 1982, p. 139-144. 13 refs.

Experiments on the effects of the structural characteristics of large circular displays rotating around the line of sight on the magnitude and onset latency of the illusory tilt of the perceived true vertical are presented. In the first experiment, subjects viewed each of nine displays with varying numbers and areas of circular elements, and it was found that the tilt magnitudes increased and latency decreased as the sum of element diameters increased, suggesting the illusion of tilt to be linear related to the logarithm of total boundary length. A second experiment conducted with two displays of equal element boundary length but different spatial frequencies confirmed the determining influence of boundary length. A final experiment with four annular displays with the same number of equally sized elements at different retinal eccentricities showed that more peripheral displays produced a greater tilt magnitude and more rapid onset, indicating the boundary effect to be influenced by retinal location.

A.L.W.

# STAR ENTRIES

**N82-20828*#** Utah State Univ., Logan.
**HIGHER PLANT RESPONSE TO ELEVATED ULTRAVIOLET IRRADIANCE Final Report**
Martyn M. Caldwell 30 Dec. 1981 425 p refs
(Contract NAS9-14871)
(NASA-CR-167538; NAS 1.26:167538) Avail: NTIS HC A18/MF A01 CSCL 06C

The effect of ultraviolet irradiation on pollen germination, ultraviolet action spectra influencing photosynthesis, and plant adaptations to ultraviolet-B radiation are reported.

**N82-20829*#** Utah State Univ., Logan.
**THE ULTRAVIOLET RADIATION ENVIRONMENT OF POLLEN AND ITS EFFECT ON POLLEN GERMINATION Final Report**
*In its* Higher Plant Response to Elevated Ultraviolet Irradiance 30 Dec. 1981 50 p refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The damage to pollen caused by natural ultraviolet radiation was investigated. Experimental and literature research into the UV radiation environment is reported. Viability and germination of wind and insect pollinated species were determined. Physiological, developmental, and protective factors influencing UV sensitivity of binucleate, advanced binucleate, and trinucleate pollen grains are compared. J.D.H.

**N82-20830*#** Utah State Univ., Logan.
**PROTECTIVE MECHANISMS AND ACCLIMATION TO SOLAR ULTRAVIOLET-B RADIATION IN OENOTHERA STRICTA Final Report**
Ronald Robberecht and Martyn M. Caldwell *In its* Higher Plant Response to Elevated Ultraviolet Irradiance 30 Dec. 1981 59 p refs
Avail: NTIS HC A18/MF A01 CSCL 06C

Plant adaptations ameliorating or repairing the damaging effects of ultraviolet-B (UV-B) radiation on plant tissue were investigated. The degree of phenotype plasticity in UV protective mechanisms and acclimation in relation to the natural solar UV-B radiation flux and in an enhanced UV-B irradiance environment was also examined. Mechanisms by which plants avoid radiation, adaptations altering the path of radiation incident on the leaf, and repair processes were considered. Attenuation of UV-B by tissues, UV-B irradiation into the leaf, and the effects of UV-B on photosynthesis were investigated. J.D.H.

**N82-20831*#** Utah State Univ., Logan.
**ACTION SPECTRA FOR PHOTOSYNTHETIC INHIBITION Final Report**
Martyn M. Caldwell, Stephan Flint, and L. B. Camp *In its* Higher Plant Response to Elevated Ultraviolet Irradiance 30 Dec. 1981 20 p refs
Avail: NTIS HC A18/MF A01 CSCL 06C

The ultraviolet action spectrum for photosynthesis inhibition was determined to fall between that of the general DNA action spectrum and the generalized plant action spectrum. The characteristics of this action spectrum suggest that a combination of pronounced increase in effectiveness with decreasing wavelength, substantial specificity for the UV-B waveband, and very diminished response in the UV-A waveband result in large radiation amplification factors when the action spectra are used as weighting functions. Attempted determination of dose/response relationships for leaf disc inhibition provided inconclusive data from which to deconvolute an action spectrum. J.D.H.

**N82-20832*#** California Univ., Berkeley. Environmental Physiology Lab.
**BODY COMPOSITION DATA FROM THE RAT SUBJECTS OF COSMOS 1129 EXPERIMENT K-316**
Nello Pace, Arthur H. Smith, Grover C. Pitts, Arkadyi S. Ushakov, and Tamara A. Smirnova 15 Jan. 1982 63 p refs
(Grant NsG-7336)
(NASA-CR-168678; NAS 1.26:168678; EPL-82-1) Avail: NTIS HC A04/MF A01 CSCL 06C

The effects of 18.5 days of weightlessness on the body composition of young, growing, male laboratory rats were examined. Three groups of 5 rats each were examined. It is indicated that exposure of young, growing, male rats to 18.5 days of weightlessness produces: (1) no effect on the quantity of fat stored by the body; (2) a slight reduction in the quantity of fat free tissue laid down by the body; (3) a small reduction in the fraction of water contained by the fat free body mass; (4) a similar reduction in the fraction of water contained by the fat free skin and fat free carcass; (5) a shift in relative distribution of the total body water from skin to viscera; (6) a diminution in the fraction of extracellular water contained by the fat free body; (7) no effect on the fraction of total skeletal musculature contained by the fat free body, as indicated by body creatine content; (8) a sizeable reduction in the fraction of bone mineral contained by the fat free body, as calculated from body calcium content. The nature of the physiological changes induced by unloading from Earth gravity in the mammalian organism are illustrated. GRA

**N82-20833#** Office of Naval Research, London (England).
**FIFTH INTERNATIONAL BIODETERIORATION SYMPOSIUM**
E. C. Haderlie 2 Dec. 1981 12 p Symp. held at Aberdeen, Scotland, 7-11 Sep. 1981
(AD-A109858; ORNL-C-13-81) Avail: NTIS HC A02/MF A01 CSCL 06/1

The meeting covered most aspects of biodeterioration ranging from the degradation of library materials to woods, metals, petroleum products, and wool. Biodeterioration was defined as the degradation of materials as a result of the activities of living organisms. Author (GRA)

**N82-20834#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 16, NO. 1, JANUARY - FEBRUARY 1982**
16 Mar. 1982 148 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982
(JPRS-80323) Avail: NTIS HC A07/MF A01

Articles addressing various aspects of aerospace medicine and space biology are presented. Physiological responses to space flight are emphasized along with problems relating to aircraft pilot performance.

**N82-20836#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF RADIOPROTECTIVE AGENTS ON REACTIVITY TO SPACE FLIGHT FACTORS**
Ye. I. Vorobyev, V. I. Yefimov, and S. K. Karsanova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 4-12

Avail: NTIS HC A07/MF A01

The experimental and clinical data published during the last 15 years that concern the effect of radioprotector drugs on the reactivity of organisms exposed to acceleration, vibration, motion sickness, hypodynamics, hypo- and hyperoxia are summarized and discussed. It is concluded that it is possible to use drugs to enhance radioresistance during flights; however, one should proceed with some caution in recommending a specific inflight radioprotective agent. The results of studies with the participation of men confirmed the assumption that intake of the short-acting radioprotector ambratin and prolonged-action protector amitetravit has no adverse effect on the human body according to tests with endurance of motion and prolonged accelerations. For this reason, they were recommended as radioprotective agents for use during manned flights aboard the Soyuz series of spacecraft. M.G.

**N82-20837#** Joint Publications Research Service, Arlington, Va.
**STRESS AND BIOLOGICAL RHYTHMS**

S. I. Stepanova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 2025 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 16-20

Avail: NTIS HC A07/MF A01

It is noted that numerous data give evidence that the reactions of the human body to diverse stimuli vary in an oscillatory, wave-like pattern. This phenomenon is associated with a general biological law of the wave-like pattern of adaptive processes, according to which they are realized at any stage (anxiety, resistance, depletion) in an oscillatory pattern. The wave-like pattern of the adaptive process is an expression of the dialectic law of unity and struggle of opposites; in this case, unity and struggle of construction and destruction, maintaining continuous self-reproduction and self-preservation of a living system in its environment. Consideration of the law of undulatory nature of the adaptation process in space opens the way for reliable forecasting of the dynamics of general state and different functions of cosmonauts during flights. It is imperative to make a special study of this phenomenon in order to further refine the set of measures related to the support of man's life in space. M.G.

**N82-20838#** Joint Publications Research Service, Arlington, Va.

### RESULTS OF STUDIES OF COSMONAUTS' VESTIBULAR FUNCTION AND SPATIAL PERCEPTION

I. Ya. Yakovleva, L. N. Kornilova, I. K. Tarasov, and V. N. Alekseyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 26-33 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 20-26

Avail: NTIS HC A07/MF A01

The results of studying the vestibular function and the function of spatial perception in 26 cosmonauts before and after 30 space flights are discussed. The typical postflight changes in these functions were: an increase in the reactivity of the otolith organ; a decrease in the sensitivity of semicircular canals; a decline in the accuracy of perception of spatial coordinates; asymmetry of most parameters, and development of illusionary reactions inflight. The cosmonauts also showed individual variations with respect to the degree of the above responses, the dynamics and length of adaptation, the development of the motion sickness symptom-complex, etc. At R+O some cosmonauts exhibited a change in the direction of the eye counter-rotation, i.e., the negative otolith reflex or at turn towards the tilt direction. Possible mechanisms of these vestibular changes are discussed. M.G.

**N82-20839#** Joint Publications Research Service, Arlington, Va.

### PROBABILITY OF CAISSON DISEASE AFTER PRESSURE DROP FROM 840 TO 308 MM Hg

A. S. Barer, M. I. Vakar, G. F. Vorobyev, L. R. Isayev, S. N. Filipenkov, and V. I. Chadov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 34-37 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 26-28

Avail: NTIS HC A07/MF A01

The mode of decompression to a pressure of 308 mm Hg after exposure for 2 to 12 h to a hyperbaric air atmosphere at a pressure of 840 mm Hg was studied. The objective was to determine the effect of additional saturation of the body with nitrogen in the presence of elevated air pressure on probability of caisson disease (altitude decompression sickness) after changing to an absolute pressure of 308 mm, which is relatively safe in decompression from normal Earth atmosphere. The decompression from the hyperbaric air atmosphere with the pressure 840 + or - 5 mm Hg and subsequent 40 min exposure to the hypobaric atmosphere 308 + or - 1 mm Hg containing 40 to 95% O2 caused a decompression disease in 5 to 40% cases. The probability of the disease depends on the duration of nitrogen saturation at an increased pressure, physical fitness and individual susceptibility to decompression sickness. M.G.

**N82-20840#** Joint Publications Research Service, Arlington, Va.

### ION REGULATING FUNCTION OF HUMAN KIDNEYS DURING LONG-TERM SPACE FLIGHTS AND IN MODEL STUDIES

A. L. Grigoryev, B. R. Dorokhova, G. S. Arzamazov, and B. V. Morukov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 38-44 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 29-33

Avail: NTIS HC A07/MF A01

Ten cosmonauts who performed 30- to 175-day space flights onboard Salyut-4 and Salyut-6, and 50 test subjects exposed to head-down tilt (-4 deg) for 182 days were examined. In actual and simulated weightlessness renal excretion of calcium and potassium increased, reaching maximum during the 4 to 6th weeks. Before and after flight the test subjects were exposed to loading salt tests. Renal excretion of calcium and potassium in response to the loading tests with their salt postlight was much higher than preflight. During the potassium chloride load the aldosterone content in blood correlated with potassium excretion, and during the calcium lacate load an increase in calcium excretion was paralleled by a decrease in the parathormone content in blood. It is most likely that the negative balance of ions in weightlessness is associated with the reduced capacity of tissues to retain electrolytes due to the decreased ion pool. It was shown that electrolyte balance can be beneficially influenced by exercise. M.G.

**N82-20841#** Joint Publications Research Service, Arlington, Va.

### STRUCTURAL AND FUNCTIONAL PROPERTIES, AND ENERGY METABOLISM OF ERYTHROCYTES DURING SPACE FLIGHTS VARYING IN DURATION

A. S. Ushakov, G. I. Kozinets, S. M. Ivanova, and V. P. Matviyenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 45-50 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 34-37

Avail: NTIS HC A07/MF A01

The structural and functional properties and energy metabolism of erythrocytes in peripheral blood of crew members who performed space flights of varying duration were investigated. Certain changes in the morphology, function, and energy metabolism of erythrocytes were seen after long-duration space flights. The demonstrated changes in energy metabolism (decline of ATP and increase in glycolytic activity) are probably related to triggering of compensatory mechanisms in response to the effects of space flight factors, and they are directed toward preserving the structural integrity of cells. On the whole, the obtained data indicate that short-term flights lasting up to 8 days do not elicit appreciable changes in structural and functional, as well as metabolic parameters of erythrocytes. M.G.

**N82-20842#** Joint Publications Research Service, Arlington, Va.

### POSITIVE PRESSURE BREATHING AS A MEANS OF PREVENTING ADVERSE REACTIONS TO ANTIORTHOSTATIC POSITION

V. G. Voloshin, V. A. Karpusheva, B. F. Asyamolov, R. A. Bondarenko, and V. S. Panchenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 51-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 38-40

Avail: NTIS HC A07/MF A01

The experiments in which 15 healthy male test subjects were exposed to head-down tilts at -15 and -30 deg demonstrated that the central and cerebral circulation can be normalized by a positive pressure breathing of 15 to 20 mm Hg with a partial compensation. Author

**N82-20843#** Joint Publications Research Service, Arlington, Va.

### RELATIONSHIP BETWEEN MICROFLORA AND IMMUNITY OF COSMONAUTS CARRYING STAPHYLOCOCCUS AUREUS IN THE NASAL CAVITY

T. N. Nikolayeva, Ye. V. Guseva, R. Yu. Tashpulatov, and G. D. Syrykh *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 55-58 refs Transl. into ENGLISH from Kosm. Biol.

Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 40-43

Avail: NTIS HC A07/MF A01

The correlations between microflora and preflight parameters of immunological resistance of cosmonauts who were carriers of S. aureus in the nasal cavity and subjects who are not carriers of this microorganism were examined. The crewmembers who carried aureus in the nasal cavity preflight showed an increased content of immunoglobulins IgA and IgM in the nasal cavity and that of IgM in blood serum postflight. The increased content of IgM in the nasal cavity did not depend on the size of the microbial focus in that biotope because there was no significant correlation between the two parameters (local and serum). M.G.

**N82-20844#** Joint Publications Research Service, Arlington, Va.

**CORRELATION BETWEEN INDIVIDUAL DISTINCTIONS OF FUNCTIONAL ASYMMETRY OF CEREBRAL HEMISPHERES AND PILOT PERFORMANCE**

A. A. Gyurdzhian and A. G. Fedoruk *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 59-62 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 44

Avail: NTIS HC A07/MF A01

It was shown that the high professional characteristics of pilots (quality of their flight performance and low susceptibility to spatial illusions) are in close correlation with the more pronounced predominance of the left hemisphere of the brain. The most informative criterion of the left hemisphere predominance that correlates with the flight performance is the index of the right ear predominance, i.e., the index of the left hemisphere predominance with respect to the speech perception. The less demonstrative parameters are the predominance of the right hand and the leading right eye. R.J.F.

**N82-20845#** Joint Publications Research Service, Arlington, Va.

**INFLUENCE OF ORIENTATION METHOD ON QUALITY OF PILOT'S SPATIAL ORIENTATION**

V. V. Lapa and N. A. Lemeshchenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 63-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 63-68

Avail: NTIS HC A07/MF A01

The efficiency of pilot's spatial orientation after disorientation was studied in relation to the coordinates system used, i.e., the method of orientation. It was found that the use of the geocentric system of coordinates (as compared to that of the geocentric system) caused and increase in the time of spatial perception and in the number of errors. It can therefore be concluded that the instrument-aided spatial orientation inflight (with the Earth unseen) must help the pilot to develop spatial perception, reflecting spatial relations in the geocentric system of coordinates. Author

**N82-20846#** Joint Publications Research Service, Arlington, Va.

**DYNAMIC OF NUTRITIONAL STATUS DURING SIMULATION OF LONG-TERM AIRCRAFT FLIGHTS**

I. G. Popov, A. A. Latskevich, V. Ye. Potkin, P. A. Lozinskiy, I. A. Romanova, and L. I. Kolesnikova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 69-76 refs Transl. into ENGLISH form Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 49-55

Avail: NTIS HC A07/MF A01

The dynamics of the nutrient status of the test subjects who performed a simulated 22 hour flight and consumed preflight and flight diets was investigated. Subjective and objective indications (body mass changes, carbohydrate, nitrogen, amino acid, mineral, and vitamin metabolism) of excessive nutrition and even acute overeating were seen. It is emphasized that, in order to prevent excessive nutrition of pilots and its harmful effects on their performance, special counter measures need to be developed. Author

**N82-20847#** Joint Publications Research Service, Arlington, Va.

**SOME FEATURES OF EVALUATION OF WORK CAPACITY AND FATIGUE IN HELICOPTER PILOTS**

Yu. N. Kamenskiy *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1981 (JPRS-80323) 16 Mar. 1982 p 77-81 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 55-58

Avail: NTIS HC A07/MF A01

In helicopter pilots the direct index of their work capacity increased while indirect indices decreased in the course of the flying shift. The peak of their professional performance occurred at the end of the flying shift coinciding with the expressed feeling of fatigue. Evaluation of professional work capacity using direct methods does not yield adequate information about the state of pilots, making them unsuitable to diagnose fatigue and to measure permissible work load. Proper diagnostics of fatigue does not necessarily require examinations of the pilot's state inflight. Adequate information can be obtained on the ground during the flying shift. Author

**N82-20848#** Joint Publications Research Service, Arlington, Va.

**PHYSIOLOGICAL AND HYGIENIC RATING OF TRANSPORT HELICOPTER VIBRATION DAMPER**

Yu. G. Matveyev and Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 82-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 59-61

Avail: NTIS HC A07/MF A01

The vibration damper reduces vibrations in the helicopter cockpit two to three-fold during horizontal flight and four to five-fold at the braking stage. The use of the vibration damper improves reception of the panel information and helicopter control, improves the working conditions, and maintains the high performance of the crewmembers during the flying shift. R.J.F.

**N82-20849#** Joint Publications Research Service, Arlington, Va.

**SIGNIFICANCE OF BONE DENSITY TO SPINAL TRAUMA RELATED TO PILOT EJECTION**

A. P. Kozlovskiy, G. P. Stupkov, V. P. Dryannykh, A. B. Arsentyev, and V. V. Chuntul *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 87-89 refs Transl. into ENGLISH form Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 62-63

Avail: NTIS HC A07/MF A01

The examinations of 27 pilots, 10 of which were catapulted, demonstrated that fractures of the spinal column occurred in those pilots (5 cases) whose heel bone density (as measured by the method of direct photon absorption) was lower than in the controls (17 cases) and in those pilots who did not have traumas, when being ejected. Author

**N82-20850#** Joint Publications Research Service, Arlington, Va.

**SIGNIFICANCE OF VESTIBULAR ASYMMETRY TO GENESIS OF VESTIBULAR DYSFUNCTION**

V. A. Kislyakov and Yu. K. Stolbkov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 90-94 refs Transl. into ENGLISH from Kosm. Biol. Aveikosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 64-67

Avail: NTIS HC A07/MF A01

In the intact pigeons and pigeons with bilaterally cut saccular nerves, stimulation of the otolith organs did not produce asymmetric reactions from the semicircular canals, whereas in pigeons with unilaterally cut saccular nerves it resulted in the asymmetry of reactions from the semicircular canals. This asymmetry was enhanced by a combined stimulation of semicircular canals and otolith organs. Author

**N82-20851#** Joint Publications Research Service, Arlington, Va.

**OPTOKINETIC FACTORS AND DEVELOPMENT OF SEASICKNESS SYMPTOMS**

L. N. Kornilova, V. A. Shakhiyeva, and I. Ya. Yakovleva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 95-99

**N82-20852**

refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 67-70

Avail: NTIS HC A07/MF A01

The effects of optokinetic stimulation of a healthy man and the development of motion sickness symptoms in response to the stimuli of different value and direction are discussed. Selective sensitivity of healthy people to optokinetic stimulaton is also discussed. R.J.F.

**N82-20852#** Joint Publications Research Service, Arlington, Va.

**HUMAN TOLERANCE OF ROTATION AT DIFFERENT LEVELS OF HYPERGRAVITY**

A. M. Genin, A. R. Kotovskaya, R. R. Galle, L. N. Gavrilova, and I. Yu. Sarkisov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 100-106 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 70-74

Avail: NTIS HC A07/MF A01

The effects of acceleration of different values (up to 2 g) on the level of motion sickness, vestibular, and postural reactions to rotation were studied. The experiments were carried out in a centrifuge equipped with a cabin that could be mounted at a different distance from the axis of rotation. Three experimental runs were conducted with a rate of rotation of 15.3 and acceleration values of 1.08, 1.6, and 2.0 g. Vestibular stimulation was produced by heat movements of a predetermined number. It was found that with increase in the the acceleration value the level of motion sickness decreased and the nystagmic reaction and balance dysfunction enhanced. Author

**N82-20853#** Joint Publications Research Service, Arlington, Va.

**COMPARATIVE EVALUATION OF PRESSURE CHAMBER CONDITIONING AND MAN'S ADAPTATION TO HYPOXIA AT HIGH ALTITUDE**

A. Yu. Katkov, R. N. Chabdarova, N. V. Pravetskiy, S. A. Vtoryy, V. V. Lenskiy, and A. A. Titov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 107-110 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 74-77

Avail: NTIS HC A07/MF A01

It was demonstrated that a 3 day pressure chamber training may increase the maximum tolerable altitude at rest from 8,600 to 8,900 m (depending on the onset rate of hypoxia) to 9,600 m. After pressure chamber training the maximum tolerable altitude increased from 8,200 m to 9,200 m, when exercising in a bicycle ergometer at 200 kgm/min and continuously ascending at a rate of 20 m/sec. A similar antihypoxic effect was also provided by a 7 day high altitude adaptation. Using polarographic measurements of oxygen tension in the skin, it was found that adaptation to hypoxia induced a more pronounced oxygen decrease at high altitudes. This can be attributed to a more distinct blood redistribution, i.e., a better blood supply of the vital organs at the expense of peripheral tissues. Author

**N82-20854#** Joint Publications Research Service, Arlington, Va.

**ACTIVITY OF SOME RAT LIVER ENZYMES FOLLOWING FLIGHT ABOARD COSMOS-936 BIOSATELLITE**

S. Nemeth and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 111-115 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 77-80

Avail: NTIS HC A07/MF A01

After the 18.5 day flight onboard the biosatellite Cosmos-936, the activity of 6 glucocorticoid-activated enzymes in the rat liver was investigated. It was found that at R+0 activities of tyrosine aminotransferase and tryptophan pyrolase, as well as fructose-1,6-diphosphatase, glucose-6-phosphatase, aspartate aminotransferase and alanine aminotransferase increased. Two two former enzymes react rapidly (within several hours) to an increase in the glucocorticoid level, whereas those latter react only to a continuous prolonged effect of glucocorticoids. These increases were paralleled by a growth in the glycogen concentration in the liver. The findings indicate that during the flight the rats underwent a chronic stress induced by weightlessness. Author

**N82-20855#** Joint Publications Research Service, Arlington, Va.

**CATECHOLAMINE CONTENT OF RAT BLOOD AFTER FLIGHT ABOARD COSMOS-936 BIOSATELLITES**

R. Kvetnansky and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 116-119 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 80-83

Avail: NTIS HC A07/MF A01

The content of epinephrine and norepinephrine was measured in plasma of the rats flown onboard the biosatellite Cosmos-936 in the weightless state and under artificial gravity. With respect to the norepinephrine content there was no difference between the two flight groups, while its level in the flight rats was higher than in the ground-based controls. The epinephrine content in the flight rats remained essentially unchanged. These data give evidence that a prolonged exposure to weightlessness is not a stressogenic factor as related to the sympathoadrenal system. Author

**N82-20856#** Joint Publications Research Service, Arlington, Va.

**INFLUENCE ON UREA HYDROLYSIS OF TYPICAL MICROFLORA OF URINE AND PRESSURIZED HABITATS**

T. Ye. Lebedeva, I. V. Yakimova, N. M. Nazarov, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 120-123 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 84-86

Avail: NTIS HC A07/MF A01

The intensive discharge of microorganisms from the human integument into the environment in a pressure chamber was investigated. The role of microflora in the process of dissociation of urea contained in urine was investigated. The ammonia released as a result of hydrolysis pollutes the atmosphere of the sealed space and has an adverse effect on the quality of water reclaimed from urine and complicates the regeneration process proper. The following areas were studied: (1) investigation of dynamics of total number of microorganisms of urine when stored for a long time under nonsterile conditions and comparison to dynamics of decomposition of urea and accumulation of ammonia in urine; (2) determination of quantity of microorganisms and intensity of decomposition of urea when sterile urine is used for monocultures of bacteria that are the most typical of the microflora of urine and sealed habitats; (3) comparative evaluation of urease activity of several strains of bacteria isolated from the interior surfaces of a manned spacecraft in flight and analogous stock strains. B.W.

**N82-20857#** Joint Publications Research Service, Arlington, Va.

**HEMATOGICAL LESIONS AS A FUNCTION OF DOSAGE OF LONG-TERM RADIATION**

V. G. Gorlov and O. V. Neyman *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 124-129 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 86-89

Avail: NTIS HC A07/MF A01

The quantitative patterns of damage to the blood system in the course of prolonged exposure to the ionizing radiation inherent in space were studied as well as the time characteristics of development of lesions in different blast elements. An effort was made to determine the minimal volume of hematological tests during long-term exposure to radiation to assess the general state of the blood system, on the basis of comparison of dynamics of changes in bone marrow and peripheral blood. Experiments were conducted on 285 mongrel rats weighing 180 to 200 g. The animals were exposed to radiation at dose rates of 300, 100, and 50 R/day. They were exposed continuosuly for 22-23/day. Analysis of the findings revealed that the dynamics of decline in total number of bone marrow cells during the phase of primary depletion is governed by an exponential law.

There was distinct demonstration of the effects of cumulative dose and dose rate. A typical finding in all cell populations of bone marrow was an initial exponential decline in number of cells. B.W.

**N82-20858#** Joint Publications Research Service, Arlington, Va.

**SEROTONIN AND HISTAMINE METABOLISM IN COSMONAUTS**

Z. S. Dolgun, S. A. Meshcheryakova, M. S. Belakovskiy, and V. I. Legenkov *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 130-133 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 89-91

Avail: NTIS HC A07/MF A01

The effects of space flight conditions on serotonin (S) and histamine (H) concentration in animal and human blood were studied. Excretion of 5-hydroxyindoleacetic acid (HIA) in urine, change under cold stress and high temperatures, anaphylactic shock, hypoxia and short- and long-term vibration were examined during prolonged hypokinesia. Certian changes were demonstrated in blood S content in animals examined after returning from a short-term space flight. B.W.

**N82-20859#** Joint Publications Research Service, Arlington, Va.

**FIRST ALL-UNION SYMPOSIUM ON PROBLEMS OF EVALUATING AND FORECASTING MAN'S FUNCTIONAL STATES IN APPLIED PHYSIOLOGY**

A. A. Maksimov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 1, Jan. - Feb. 1982 (JPRS-80323) 16 Mar. 1982 p 134-135 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 1, Jan. - Feb. 1982 p 91-92

Avail: NTIS HC A07/MF A01

Some aspects of the problems of man's functional states, his health, and work capacity were studied. The following topics were examined: forecasting man's functional state in aviation and cosmonautics; forecasting the functional state of athletes; forecasting the functional state of the body in industrial physiology; forecasting in human ecology; and reliability of man-machine systems. B.W.

**N82-20860** California Univ., San Diego.

**PATTERNS OF BACTERIOPLANKTON GROWTH IN THE SEA Ph.D. Thesis**

Jed Alan Fuhrman 1981 122 p

Avail: Univ. Microfilms Order No. 8129243

The bacterioplankton role in organic matter flux from phytoplankton to higher trophic levels was studied. Two approaches were developed for measuring bacterioplankton growth. The first assumes only growing cells synthesize DNA; rates of tritiated thymidine incorporation into DNA are used to calculate bacterioplankton growth rates. The second approach measures the increase of bacterial numbers in seawater which had been filtered to remove bacteriovores. The thymidine incorporation approach was more sensitive, foster and easier to use at sea, and less subject to artifacts than the other approach, so it was chosen for most field studies almost exclusively by bacteria, and effectively all the 'active' bacteria utilize exogeneous thymidine. Production estimates were lower in Antarctic waters than in temperate waters and the fraction of primary production which is channeled into bacterioplankton production in both eutrophic and oligotrophic waters was approx. 5% to 25%. Dissert. Abstr.

**N82-20861** Michigan State Univ., East Lansing.

**ULTRASONIC BLOOD FLOW IMAGING USING CORRELATION PROCESSING Ph.D. Thesis**

Michael De Olinger 1981 58 p

Avail: Univ. Microfilms Order No. 8126538

A general investigation of those fundamental processes affecting the design of ultrasonic blood flow imaging instruments is presented. First, known physical attributes of the various biological issues are combined to formulate a simple model which describes the interaction of ultrasound with the human body. Using this model, it is shown that a periodic pulse train is the preferred transmitted signal and that significant performance improvement may be realized by implementing true correlation as opposed to the conventional correlation processing. The desirability of having the true correlation receiver operate in a near optimum manner is demonstrated and the constraints imposed on signal bandwidth, effective signal duration, achievable velocity resolution and transducer angle are presented. In order to present the complex interrelationships which exist between these constraints, a unique set of design curves were generated. These curves indicate those combinations which insure near optimality. Dissert. Abstr.

**N82-20862** Washington Univ., Seattle.

**A QUANTITATIVE ANALYSIS OF TRANSCUTANEOUS OXYGEN MEASUREMENT Ph.D. Thesis**

Daniel Wade Piraino 1981 207 p

Avail: Univ. Microfilms Order No. 8126136

The effects of skin blood flow, diffusion, and temperature each independently on the transcutaneous measurement of oxygen were determined. A model was derived to predict the transcutaneous oxygen partial pressure under varying conditions of blood flow, temperature, and arterial oxygen partial pressure. The model was then compared to data from twelve volunteer subjects under different conditions of blood flow and temperature. The following results were found. (1) The model is valid only after heating the sensor to 44-45 C. (2) There is a hysteresis with temperature in the quantity d/x sub o, where d is the diffusion constant and x sub o is the distance from capillary to skin sensor. If skin is preheated to 44-45 C for one-half hour, transcutaneous oxygen measurements at a lower temperature will be higher than if the skin had not been preheated, at the same blood flow. (3) At 41 C, with the hemoglobin curve shift taken into account, skin blood flow is adequate for 97% arterialization. These results may be applied to the future correction of the transcutaneous oxygen value in adult patients in critical care areas. Dissert. Abstr.

**N82-20863*#** National Aeronautics and Space Administration, Washington, D. C.

**STUDIES ON THE FLIGHT MEDICAL ASPECTS OF THE GERMAN LUFTHANSA NON-STOP ROUTE FROM FRANKFURT TO RIO DE JANEIRO, PART 1**

H. M. Wegmann, K. E. Klein, K. M. Goeters, and A. Samel Feb. 1982 29 p refs Transl. into ENGLISH of rept. 18-316-81-01 DFVLR (West Germany), 1981 26 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76659; NAS 1.15:76659) Avail: NTIS HC A03/MF A01 CSCL 06S

The problem of crew size for regularly scheduled flights between Frankfurt and Rio de Janeiro is discussed. Factors affecting crew performance are examined, comparisons are drawn to regulations of other countries and crew questionnaires and tests are presented. S.L.

**N82-20864*#** National Aeronautics and Space Administration, Washington, D. C.

**DETERMINATION OF OXYGEN TENSION IN THE SUBCUTANEOUS TISSUE OF COSMONAUTS DURING THE SALYUT-6 MISSION**

S. Baranski, R. Bloszczynski, M. Hermaszewski, J. Kubiczkowa, A. Piorko, R. Saganiak, Z. Sarol, F. Skibniewsky, J. Stendera, and W. Walichnowski Mar. 1982 8 p Transl. into ENGLISH from Postepy Astronaut. (Poland), v. 12, no. 4, 1979 p 75-80 Translation was announced as A80-30518 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76793; NAS 1.15:76793) Avail: NTIS HC A02/MF A01 CSCL 06P

A polarographic technique was used to measure the oxygen tension in subcutaneous tissue of the forearm of a cosmonaut prior to, after, and on the fourth day of a space mission performed by Salut-6. A drop in the oxygen exchange rate in the peripheral tissues during weightlessness was observed. The mechanisms of this change are studied, taking into consideration the blood distribution in the organism and microcirculation disorders reflected by a decreased blood flow rate in arterial-venous junctions. Author

**N82-20865#** Committee on Science and Technology (U. S. House).

**NATIONAL TOXICOLOGY PROGRAM**

Washington GPO 1981 189 p Hearing before the Subcomm. on Investigations and Oversight of the Comm. on Sci. and Technol., 97th Congr., 1st Sess., No. 32, 15 Jul. 1981

(GPO-85-397) Avail: Subcomm. on Investigations and Oversight

The activities, plans, and priorities of the national toxicology program are discussed. The aim of the program is to develop through research the scientific information needed to protect the public health from damage by exposure to hazardous toxic substances. The effectiveness of the program was discussed. Carcinogens, particularly asbestos, are discussed. Bioassays and other forms of analysis are evaluated. R.J.F.

**N82-20867#** Army Engineer Topographic Labs., Fort Belvoir, Va.

**A STUDY OF THE HUMAN VISUAL SYSTEM IN SUPPORT OF AUTOMATED FEATURE EXTRACTION Research Note, Sep. 1979 - Sep. 1980**

Frederick W. Rohde Oct. 1981 34 p refs
(DA Proj. 4A1-61101-A-91D)
(AD-A109139; ETL-0271) Avail: NTIS HC A03/MF A01 CSCL 06/16

An in-depth study of the anatomy and architecture of the visual system was conducted. Signal processing along the visual pathway was analyzed. The functions of the major components of the visual system were studied and the number of neurons determined. A comparison of the visual system with a computer was made. The concept of a feature extraction system was developed and discussed. Author (GRA)

**N82-20868#** Integrated Sciences Corp., Santa Monica, Calif.

**FEMALE AND MALE SIZE, STRENGTH AND PERFORMANCE: A REVIEW OF CURRENT LITERATURE**

Mark D. Phillips, Anne Bogardt, and Ross L. Pepper San Diego, Calif. Naval Ocean Systems Center Oct. 1981 159 p refs
(Contract N00123-80-D-0104)
(AD-A109270; ISC-342-1; NOSC/CR-107) Avail: NTIS HC A08/MF A01 CSCL 06/14

The increase in female personnel utilization aboard ship has initiated a need to examine gender based differences in anthropometrics, biomechanics, psychophysical performance, physiological attributes and the relationship of these factors to the design of shipboard equipment and fittings. Literature in this area was examined by Ayoub et al (1978). The purpose of the present report was to update and extend the baseline established by Ayoub et al (1978) by examining current work. GRA

**N82-20869#** Thoratec Labs. Corp., Berkeley, Calif.

**FABRICATION OF CARDIOVASCULAR DEVICES Annual Report, Jun. 1980 - May 1981**

David J. Farrar, John H. Lawson, Keith E. Buck, Robert S. Ward, and Kathleen OConner Apr. 1981 57 p refs
(Contract N01-HV-9-2906)
(PB82-120148; NIH-N01-HV-92906-2) Avail: NTIS HC A04/MF A01 CSCL 06L

The fabrication of components primarily related to left ventricular assist devices LVAD components, such as bladders, bodies, covers, pusher plates, cannules, and valve housing were fabricated and the integration of Thoratec blood pumps and actuators developed. In addition, preparations were made for the fabrication of clinical quality ventricular assist devices. These activities included design drawings detailed fabrication procedures, boiling, and initial fabrication of pump components. Polymer processing and handling techniques during fabrication were improved and the test stations were modified for life tests of seamless bladder LVADs. GRA

**N82-20870#** Tracor Jitco, Inc., Rockville, Md.

**ENVIRONMENTAL AND HEALTH ASPECTS OF CHLOROFORM: A COMPREHENSIVE BIBLIOGRAPHY OF PUBLISHED LITERATURE, 1930 - 1981**

Jun. 1981 311 p
(Contract EPA-68-01-5836)
(PB82-110115; EPA-560/7-81-011) Avail: NTIS HC A14/MF A01 CSCL 06T

The citations were selected from a thorough literature search, and broadly classified as having primarily environmental or biological emphasis. The sources used in the search are identified, and for the portion performed on line, the search strategies are also included. GRA

**N82-20871#** Navy Personnel Research and Development Center, San Diego, Calif.

**COMPUTER-MANAGED INSTRUCTION IN NAVY TECHNICAL TRAINING: AN ATTITUDINAL SURVEY Final Report, Jun. 1980 - Mar. 1981**

Carol Ann Robinson, Elizabeth A. Tomblin, and Archester Houston Dec. 1981 53 p refs
(AD-A109664; NPRDC-TR-82-19) Avail: NTIS HC A04/MF A01 CSCL 05/9

Relatively little reliable data exist concerning the attitudes of students and instructors toward computer-managed instruction. This study attempted to determine attitudes of students and instructors and to identify factors related to these attitudes. It was found that students were favorable toward CMI while instructors were generally not favorable. Also, the trainee's experiences with the Navy are related to attitudes toward the CMI system. The longer the trainee is in the service, the more negative the individual tends to be toward the system. Author (GRA)

**N82-20872#** Naval Postgraduate School, Monterey, Calif.

**AN EVALUATION OF THE EFFECTIVENESS OF COLOR CODED TACTICAL SYMBOLOGY APPLIED TO MILITARY MAPS M.S. Thesis**

Peter Kafurke Sep. 1981 89 p refs
(AD-A109675) Avail: NTIS HC A05/MF A01 CSCL 05/1

This thesis examined the effect of using color coded tactical symbology on military maps. It reviewed the basic aspects of color coding techniques and described a task paced experiment in which conventional monochrome (blue vs. red) coding techniques were compared to multiple color coding. The multicolor coded stimuli used were 5 standard symbols representing Artillery, Armor, Infantry, Mechanized Infantry and Engineers. The symbols were coded red, green, blue, orange and black respectively. The analysis of the data obtained from 20 subjects revealed that performance under multicolor coding condition was significantly superior with respect to response time, accuracy of response and accuracy of location transfer onto a copy of the displayed map. Author (GRA)

**N82-20873#** Maryland Univ., College Park. Computer Science Center.

**RELATIVE DEPTH AND LOCAL SURFACE ORIENTATION FROM IMAGE MOTIONS**

K. Prazdny Jan. 1981 34 p refs
(Contract DAAG53-76-C-0138; DARPA Order 3206)
(AD-A109565; CSC-TR-996) Avail: NTIS HC A03/MF A01 CSCL 05/8

A simple mathematical formalism is presented suggesting a mechanism for computing relative depth of any two texture elements characterized by the same relative motion parameters. The method is based on a ratio of a function of the angular velocities of the projecting rays corresponding to the two texture elements. The angular velocity of a ray cannot, however, be computed directly from the instantaneous characterization of motion of a 'retinal' point. It is shown how it can be obtained from the (linear) velocity of the image element on the projection surface and the first time derivative of its direction vector. A similar analysis produces a set of equations which directly yield local surface orientation relative to a given visual direction. The variables involved are scalar quantities directly measurable on the projection surface but, unlike the case of relative depth, the direction of (instantaneous) motion has to be computed by different means before the method can be applied. The relative merits of the two formalisms are briefly discussed. Author (GRA)

**N82-20874#** Maryland Univ., College Park. Computer Vision Lab.

**DETERMINING THE INSTANTANEOUS DIRECTION OF MOTION FROM OPTICAL FLOW GENERATED BY A CURVILINEARLY MOVING OBSERVER**

K. Prazdny Feb. 1981 30 p refs
(Contract DAAG53-16-C-0138; DARPA Order 3206)
(AD-A109566; CSC-TR-1009) Avail: NTIS HC A03/MF A01 CSCL 05/8

A method is described capable of decomposing the optical flow into its rotational and translational components. The translational component is extracted implicitly by locating the focus of expansion associated with the translational component of the relative motion. The method is simple, relying on minimizing an (error) function of three parameters. As such, it can also be applied, without modification, in the case of noisy input information. Unlike the previous attempts at interpreting optical flow to obtain information about the three dimensional disposition of texture elements, the method uses only relationships between quantities on the projection plane. No 3D geometry is involved. Also outlined is a possible use of the method for the extraction of that part of the optical flow containing information about relative depth directly from the image intensity values, without extracting the 'retinal' velocity vectors. Author (GRA)

**N82-20875#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
**DISPLAY-CONTROL COMPATIBILITY IN 3-D DISPLAYS. 1: EFFECTS OF ORIENTATION**
A. W. F. Huggins and David J. Getty 15 Nov. 1981 79 p refs
(Contract N00014-80-C-0750; NR Proj. 196-166)
(AD-A109491; BBN-4724) Avail: NTIS HC A05/MF A01 CSCL 09/2

The recent development of true volumetric displays, such as SpaceGraph, has raised questions about display-control relationships that cannot be answered from earlier work with 2-D displays. We measured the speed and accuracy of simple control decisions when the displayed object was presented in orientations rotated away from congruence with the control orientation. Reaction times were measured for identifying the marked face of a static cube, presented with SpaceGraph, as a function of how much the cube image was rotated away from congruence with fixed physical cube on which the observer responded, and which dimension of the display corresponding to the rotation axis. The following results were obtained: The fastest and most accurate identifications occurred when there was a simple direct spatial mapping between the display and the control for all orientations presented. Decision times made with this strategy were relatively unaffected by orientation; Marked display-control incompatibility was found under some specific conditions; and The shape of the decision time functions suggest that decision strategies involved both propositioned coding and mental rotation. Author (GRA)

**N82-20876*#** Tulane Univ., New Orleans, La. Medical School
**GENETIC ENGINEERING POSSIBILITIES FOR CELSS: A BIBLIOGRAPHY AND SUMMARY OF TECHNIQUES Final Report**
Emmett J. Johnson Mar. 1982 22 p refs
(NASA Order A-73308B)
(NASA-CR-166306; NAS 1.26:166306) Avail: NTIS HC A02/MF A01 CSCL 06C

A bibliography of the most useful techniques employed in genetic engineering of higher plants, bacteria associated with plants, and plant cell cultures is provided. A resume of state-of-the-art genetic engineering of plants and bacteria is presented. The potential application of plant bacterial genetic engineering to CELSS (Controlled Ecological Life Support System) program and future research needs are discussed. Author

**N82-20877#** Los Alamos Scientific Lab., N. Mex.
**TESTING AND EVALUATION OF THE US NAVY SUPPLIED AIR SUIT**
O. D. Bradley and James D. DeField Feb. 1981 42 p ref
(Contract W-7405-eng-36)
(LA-8727-MS) Avail: NTIS HC A03/MF A01

An airline type supplied air suit for use during the asbestos removal operations is discussed. This supplied air suit was submitted for testing and evaluation of the degree of protection provided. Testing was limited to (1) evaluating interior sound pressure levels, (2) evaluating integrity of air lines and connectors, and (3) evaluating suit removal procedures. The testing was performed using a 16 cubic meter test chamber and a polydispersed dioctyl phthalate aerosol. Aerosol concentrations were measured with a light scattering photometer. The spunbonded olefin supplied air suit indicated protection factors in excess of 18K for all subjects tested and in all tests performed. R.J.F.

**N82-20878*#** University of Southern California, Los Angeles. Inst. for Technoeconomic Systems.
**A STUDY OF INTERACTIVE CONTROL SCHEDULING AND ECONOMIC ASSESSMENT FOR ROBOTIC SYSTEMS Final Report**
29 Jan. 1982 23 p refs
(Contracts NAS7-100; JPL-955332)
(NASA-CR-168652; JPL-9950-645; NAS 1.26:168652; ITEC-10-81) Avail: NTIS HC A11/MF A01 CSCL 05H

A class of interactive control systems is derived by generalizing interactive manipulator control systems. Tasks of interactive control systems can be represented as a network of a finite set of actions which have specific operational characteristics and specific resource requirements, and which are of limited duration. This has enabled the decomposition of the overall control algorithm simultaneously and asynchronously. The performance benefits of sensor referenced and computer-aided control of manipulators in a complex environment is evaluated. The first phase of the CURV arm control system software development and the basic features of the control algorithms and their software implementation are presented. An optimal solution for a production scheduling problem that will be easy to implement in practical situations is investigated. S.L.

**N82-20879#** National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
**HOMSIM: A SIMULATOR OF THREE-DIMENSIONAL HOMINOID DYNAMICS**
H. Hatze and A. Venter Apr. 1981 56 p refs
(CSIR-SR-SWISK-23; ISBN-0-7988-2103-5) Avail: NTIS HC A04/MF A01

Model equations, and the FORTRAN IV computer program HOMSIM implementing these equations, of a 17 segment hominoid moving in three dimensional space are described. The motion is considered unconstrained and all external force (except gravity) and torque vectors acting on the 17 segments, as well as internal joint torques, must be specified by the user as input functions. Author

**N82-20880#** Aeronautical Research Labs., Melbourne (Australia).
**A REVIEW OF AIRCRAFT CABIN CONDITIONING FOR OPERATIONS IN AUSTRALIA**
Brian Rebbechi Oct. 1980 80 p refs
(AD-A109044; ARL/MECH-ENG-159) Avail: NTIS HC A05/MF A01 CSCL 13/1

A review is presented of aircraft cabin conditioning. This review has been undertaken because of the inadequate performance of many aircraft air conditioning systems in the hottest conditions encountered in Australia. The factors included in this study were the climatic conditions (both Australia and world-wide), human performance in hot conditions, the heat balance of aircraft cabins, cooling system performance, and specification of cabin environment control systems. It is concluded that climatic conditions in Australia are not severe in a world-wide context, and that there is no technological reason why the cabin conditioning systems of aircraft should be inadequate. Compliance with present RAAF specifications will provide an acceptable cabin environment for operation of aircraft in Australia. Author (GRA)

**N82-20881#** Naval Ocean Systems Center, San Diego, Calif. Man-Systems Interaction Div.
**MODELS AND MOCKUPS AS DESIGN AIDS, REVISION A**
N. J. Buchacz 29 Sep. 1981 123 p refs
(AD-A109511; NOSC/TD-266-Rev-A) Avail: NTIS HC A06/MF A01 CSCL 14/2

This report describes the application of models and mockups as design aids in initially determining or improving control panel layouts and equipment/compartment arrangements to facilitate personnel and personnel/equipment interactions during system operations and maintenance. The report describes how these models and mockups (M&M) have been used, types of M&M and their applications in various phases of the design development cycle, and finally, a description of the use of M&M for man-machine design and design improvements. Three appendices are included in the report and contain: (1) Descriptions of NOSC M&M applications; (2) Examples of M&M specifications; and (3) An M&M characteristics checklist to aid in the preparation of M&M specifications. Author (GRA)

**N82-20882#** Royal Aircraft Establishment, Farnborough (England).
**A COMPARISON OF RAF AND ITALIAN AIRCREW: ANTHROPOMETRIC DATA**
E. J. Lovesey London HMSO Nov. 1980 20 p refs
(RAE-TM-FS-367; BR77205) Avail: NTIS HC A02/MF A01

Means and standard deviations were taken from Hertzberg's anthropometric survey of Italian pilots and from a survey of 2,000 RAF aircrews. The results generally show that the Italian pilots have similar body and limb circumferences to RAF aircrews. The Italian linear dimensions are, however, considerably less than those of the RAF aircrews. These differences need to be taken into account when designing cockpit and rear cabin work stations. Author (ESA)

**N82-20883#** European Space Agency, Paris (France).
**SYSTEM SIMULATION APPLIED TO THE EVALUATION OF DISPLAYS FOR GUIDANCE AND CONTROL**
Uwe Teegen Sep. 1981 60 p refs Transl. into ENGLISH of "Moeglichkeiten der Systemsimulation zur Bewertung von Flugfuehrungsanzeigen", Rept. DFVLR-Mitt-79-10 DFVLR, Brunswick, Jul. 1979
(ESA-TT-659; DFVLR-Mitt-79-10) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 12,60

The development of displays for monitoring and controlling complex technical systems is facilitated by employing a computer simulation of the man machine system during the theoretical design phase. A simulation model for the manual control task is described which leads to a method for evaluating displays. The capabilities and applications of this simulation model to a pilot airplane system restricted to aircraft motion in the vertical plane and a two channel pilot model are presented. Results suggest that the model should be further developed. Author (ESA)

**N82-20884*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**LIFE IN THE UNIVERSE**
John Billingham, ed. Jan. 1982 465 p refs Proc. of conf. held at Moffett Field, Calif., 19-20 Jun. 1979 Analytic primary previously announced in IAA as A82-22976; subsidiaries previously announced as A82-22977 through A82-23004
(NASA-CP-2156; A-8242; NAS 1.55:2156; LC-81-22350) Avail: NTIS MF A01; SOD HC $8.00 as SN 033-000-0084-4 CSCL 06F

Papers are presented concerning the nature and distribution of life in the universe, particularly in the areas of the origins of life, life-supporting environments, the evolution of life in the Galaxy, and the detectability of technological civilizations. Specific topics include a preliminary discussion of the role of life in the universe, followed by examination of the role of water in thin films and cold environments in the origin of life, the relation between atmospheric composition and evolution, the possibility of planetary orbits in multiple star systems, and the prospects for detecting extrasolar planetary systems. Attention is also given to the origin of protein synthesis, the evolution of intelligence in multicellular organisms, the manifestations of advanced civilizations, and plans and principles for SETI. A.L.W.

**N82-21151*#** Control Data Corp., Minneapolis, Minn.
**CABIN OZONE AND TROPOPAUSE DEFINITION**
Arthur D. Belmont *In* NASA. Marshall Space Flight Center Proc.: 5th Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Dec. 1981 p 86-89 ref

Avail: NTIS HC A07/MF A01 CSCL 06K

A method to estimate ozone profiles is based on knowing the total ozone which may come from any observational system available such as Dobson photometers that are available from NMC forecasts and used operationally in flight planning. From this an ozone profile at selected pressure levels is obtained. The technique was based on five years of ozonesonde data. So far, models have been developed for winter, spring, and fall. A.R.H.

**N82-21866*#** National Aeronautics and Space Administration, Washington, D. C.
**ROLE OF IMMOBILIZATION OF IRRADIATED RATS IN THE PROTECTIVE EFFECT OF BONE MARROW SHIELDING**
N. F. Gronskaya and G. S. Strelin Feb. 1982 7 p refs Transl. into ENGLISH from Radiobiologiya (Leningrad), v. 20, no. 2, 1980 p 259-262 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Central Sci. Res. X-ray Radiological Inst. of the USSR Ministry of Public Health
(Contract NASw-3542)
(NASA-TM-76828; NAS 1.15:76828) Avail: NTIS HC A02/MF A01 CSCL 06C

Rats were exposed to X-radiation to study the influence of immobilization and shielding of part of bone marrow during exposure on survival. It is concluded that (1) the beneficial effect of the stress factor (created by the immobilization of rats during exposure) can aggregate with the effect of bone marrow shielding and, under certain conditions, imitate the latter; and (2) the probability of the protective effect of immobilization should be taken into account when assessing the influence of bone marrow shielding. Author

**N82-21867*#** National Aeronautics and Space Administration, Washington, D. C. Inst. for Morphology.
**MORPHOMETRICAL INVESTIGATIONS ON THE REPRODUCTIVE ACTIVITY OF THE OVARIES IN RATS SUBJECTED TO IMMOBILIZATION AND TO MOTION ACTIVITY**
N. Konstantinov, L. Cheresharov, and S. Toshkova Mar. 1982 15 p refs Transl. into ENGLISH from Veterinarnomeditsinski Nauki (Sofia), v. 16, no. 6, 1979 p 66-74 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Bulgarian Academy of Sci., Sofia
(Contract NASw-3541)
(NASA-TM-76831; NAS 1.15:76831) Avail: NTIS HC A02/MF A01 CSCL 06C

Wistar-strain white female rats were divided into three groups, with the first group subjected to motion loading, the second used as control, and the third group was immobilized. A considerable reduction in numbers of corpora lutea was observed in the immobilized group, together with smaller numbers of embryos, high percent of embryo mortality, fetal growth retardation, and endometrium disorders. The control group showed no deviation from normal conditions, and there was slight improvement in reproductive activity of animals under motion loading. B.W.

**N82-21868*#** Alabama Univ. in Birmingham. Div. of Molecular Biology.
**THE CHEMICAL BASIS FOR THE ORIGIN OF THE GENETIC CODE AND THE PROCESS OF PROTEIN SYNTHESIS Semiannual Report**
22 Dec. 1981 19 p refs
(Grant NGR-01-010-001)
(NASA-CR-168748; NAS 1.26:168748) Avail: NTIS HC A02/MF A01 CSCL 06C

The principles upon which the process of protein synthesis and the genetic code were established are elucidated. Extensive work on nuclear magnetic resonance studies of both monomer-monomer and monoamino acid polynucleotide interactions is included. A new method of general utility for studying any amino acid interacting with any polynucleotide was developed. This system involves the use of methyl esters of amino acids interacting with polynucleotides. N.W.

**N82-21869*#** Oklahoma State Univ., Stillwater. Dept. of Microbiology.
**MICROBIAL ECOLOGY OF EXTREME ENVIRONMENTS: ANTARCTIC DRY VALLEY YEASTS AND GROWTH IN SUBSTRATE LIMITED HABITATS Progress Report, 1 Dec. 1980 - 30 Nov. 1981**
Helen S. Vishniac 30 Nov. 1981 27 p refs
(Grant NAGw-26)
(NASA-CR-168742; NAS 1.26:168742) Avail: NTIS HC A03/MF A01 CSCL 06C

The multiple stresses temperature, moisture, and for chemoheterotrophs, sources of carbon and energy of the Dry Valley Anarctica soils allow at best depauperate communities, low in species diversity and population density. The nature of community structure, the operation of biogeochemical cycles, the evolution and mechanisms of adaptation to this habitat are of interest in informing speculations upon life on other planets as well as in modeling the limits of gene life. Yeasts of the Cryptococcus vishniacii complex (Basidiobiastomycetes) are investigated, as the only known indigenes of the most hostile, lichen free, parts of the Dry Valleys. Methods were developed for isolating these yeasts (methods which do not exclude the recovery of other microbiota). The definition of the complex was refined and the importance of nitrogen sources was established as well as substrate competition in fitness to the Dry Valley habitats. S.L.

**N82-21870#** Materials Research Labs., Melbourne (Australia).
**SETTLEMENT OF FOULING ORGANISMS AT THE JITTRE NORTH BARNARD ISLAND RAFT SITE**
John A. Lewis Apr. 1981 13 p refs
(MRL-TN-450) Avail: NTIS HC A02/MF A01

Data on the settlement of the major fouling organisms below the marine exposure raft at the North Barnard Islands, Queensland, are presentd for a twelve month period. Organisms settled throughout the year. The red algal species Heterodermа sp. and Laurencia obtusa were the dominant organisms when assessed as number of individuals per unit area. However, the most abundant organisms were the brown alga Feldmannia indica, the hydroid Campanularia delicatula and the stoloniferous bryozoan Aetea truncata. In all, seventy-one taxa from ten phyla settled during the study period. On the basis of fouling settlement, the raft is considered a suitable site to test the resistance of coatings to fouling growth under tropical conditions. R.J.F.

**N82-21871#** Materials Research Labs., Melbourne (Australia).
**SETTLEMENT OF FOULING ORGANISMS AT THE HMAS STIRLING RAFT SITE**
John A. Lewis Nov. 1980 13 p refs
(MRL-TN-441) Avail: NTIS HC A02/MF A01

The settlement of fouling organisms on non-toxic panels was studied over a twelve-month period on a marine exposure raft at HMAS STIRLING in Cockburn Sound, western Australia. Monthly settlement counts for the six major organisms and water temperature measurements indicated that the raft met the criteria of Australian Standard 1580, test method 481.5 in these respects, as required for registration by the National Association of Testing Authorities. Larval settlement occurred throughout the year and water temperatures are within the range prescribed by the standard. Species which settled on the panels represented each of the major groups of fouling organisms. Panels immersed for twelve months were initially dominated by algae but these were subsequently displaced by barnacles, ascidians and bivalve molluscs. R.J.F.

**N82-21872#** Materials Research Labs., Melbourne (Australia).
**THE EFFECTS OF UNDERWATER EXPLOSIONS ON MARINE LIFE IN SHOALWATER BAY, QUEENSLAND**
I. C. Dunstan and J. A. Lewis Sep. 1980 32 p refs
(MRL-R-795) Avail: NTIS HC A03/MF A01

Data on the effects of underwater explosions on marine life are presented. This was done in order to assess the ecological and biological impact on marine communities of underwater explosions in Shoalwater Bay, Queensland. A general assessment of the possible effects of the explosions is given on the basis of overseas data relevant to the biological effects of underwater explosions, and from the limited data published on the marine communities of the Queensland coast. R.J.F.

**N82-21873#** Georgia Inst. of Tech., Atlanta. Biomedical Research Branch.
**INVESTIGATION OF RADIOFREQUENCY RADIATION EFFECTS ON EXCITABLE TISSUES Final Technical Report**
R. L. Seaman, E. C. Burdette, and R. L. DeHaan (Emory Univ.)
31 Jul. 1981 100 p refs
(Contract F39620-79-C-0055; AF Proj. 2312)
(AD-A109813; AFOSR-82-0020TR) Avail: NTIS
HC A05/MF A01 CSCL 06/18

Spheroidal aggregates of cultured chick cardiac cells were used to study effects of 2450-MHz radiofrequency radiation (RFR) on excitable membranes. Rhythmically beating aggregates under normal culture conditions were exposed to known amounts of RFR energy in a specially developed open-ended coaxial device. Exposure level was given in terms of Specific Absorption Rate (SAR) in mW/g. Short-term recordings with intracellular electrodes suggested that increased variability in beat rate and in action potential maximum upstroke velocity occurred in the range of 10-40 mW/g for continuous wave (CW) RFR and RFR modulated as 10.9-microsecond pulses at 10,000 pps (PW). Long-term recordings with extracellular electrodes and video imaging were used to gather interbeat interval (IBI) data for computing mean IBI and coefficient of variation (CV). Three-minute exposures to CW and PW RFR and to RFR square-wave modulated at 1.6 or 16 Hz were made for SARs between 1.2 and 85.5 mW/g. Decreases in mean IBI during exposure for SARs greater than 30 mW/g closely matched those expected from induced temperature rises. However, IBI changes at smaller SARs, including an increase at 1.2 mW/g, were not fully explained by temperature changes. Small changes in CV occurred during exposure and were similar to those during sham exposures. GRA

**N82-21874#** Smithsonian Institution, Washington, D. C. Radiation Biology Lab.
**PRIMARY LIGHT-HARVESTING SYSTEM: PHYCOBILISOMES AND ASSOCIATED MEMBRANES Progress Report, 1 Jan. - 31 Dec. 1981**
E. Gantt 1981 5 p refs
(Contract DE-AS05-76ER-04310)
(DE81-028326; DOE/ER-04310/22) Avail: NTIS
HC A02/MF A01

Phycobilisomes, serving as primary light harvesting complexes in cyanobacteria and red algae, were investigated. Allophycocyanin is in the center near the thylakoid. Stacked rods composed of phycocyanin, or phycocyanin phycoerythrin radiate peripherally from the allophycocyanin core. Phycobilisomes of Nostoc sp. and Fremyella diplosiphon, after separation into separate allophycocyanin and phycoerythrin phycocyanin fractions were associated in vitro. Hybrid phycobilisomes, derived from mixtures of phycobiliprotein from these species were also obtained. Phycobilisomes were similar in their sedimentation, absorption, fluorescence excitation, fluorescence emission, and by electron microscopy. Many of the colorless polypeptides were also highly similar between Nostoc and Fremyella. The polypeptide composition of Porphyridium cruentum phycobilisomes is the most complex of any thus far examined. The phycobiliprotein containing polypeptides comprised 84% of the total stainable protein, while the remaining were colorless. Most of the colorless polypeptides occurred in a pelletable fraction, which was enriched in allophycocyanin and phycocyanin. DOE

**N82-21875#** Beth Israel Hospital, Boston, Mass. Div. of Nuclear Medicine.
**MOLECULAR EVENTS BASIC TO CELLULAR RADIATION RESPONSE Progress Report, 1 Oct. 1980 - 31 Dec. 1981**
G. M. Kolodny 1981 21 p refs
(Contract DE-AC02-80EV-10327)
(DE81-029813; DOE/EV-10327/T1) Avail: NTIS
HC A02/MF A01

Research during the past year was directed at induction of specific protein synthesis in differentiated mammalian cells. The Primer Hypothesis for the regulation of eukaryotic gene expression suggests that RNA transcription is primed by small molecular weight RNA. It predicts that albumin mRNA transcription in a 3T3 fibroblast, which ordinarily does not produce albumin, can be initiated by RNA primer present in liver cells. During this past year experiments in which mouse fibroblasts were incubated with mouse liver RNA in the presence of polylysine were continued. Although these cells did indeed produce albumin which was detected by counterimmunoelectrophoresis the results were not consistent but depended on as yet unknown conditions of the extracted RNA. Conditions of phenol preparation extraction of RNA and incubation of RNA and cells were carefully monitored. None of these variations in technique were successful in reproducibly stimulating albumin synthesis on a repetitive basis although intermittently positive results were obtained. Because of these inconsistent results other methods of introducing RNA into cells were considered. DOE

**N82-21877#** Materials Research Labs., Melbourne (Australia).
**A COMPARISON OF THE ANTIMUSCARINIC PROPERTIES OF APROPHEN WITH THOSE OF SOME OTHER ANTICHOLINERGIC DRUGS**
R. M. Dawson, S. E. Freeman, and B. M. Paddle Sep. 1980
11 p refs
(MRL-R-794) Avail: NTIS HC A02/MF A01

Apparent dissociation constants K sub i for the interaction of benactyzine, aprophen, and atropine with the muscarinic cholinoceptor were determined in the brain (striatum and pons-medulla) and ileum of the guinea pig by competition with (3H)- quinuclidinyl benzilate (QNB) in a direct binding assay. Corresponding dissociation constants in the atrium were determined by antagonism of antagonism of acetylcholine-induced contractions. In all regions studied, aprophen and benactyzine (which are closely related structurally) were approximately equi-effective, based on their K sub i values, and about 1/4 as effective as atropine. Hyoscine and the glycollate T3436 were also studied in the atrium and found to be more potent muscarinic antagonists than atropine. Values of K sub i were in the nanomolar range. For any one antagonist, significant differences were observed between K sub i values for different regions. Author

**N82-21878#** Materials Research Labs., Melbourne (Australia).
**AN EXAMINATION OF THE FEASIBILITY OF ADMINISTERING PROPHYLACTIC PYRIDOSTIGMINE BY THE PERCUTANEOUS ROUTE**
Hugh D. Crone and Michael P. Bladen 1981 16 p refs
(MRL-TN-449) Avail: NTIS HC A02/MF A01

The feasibility of administering pyridostigmine by the percutaneous route was examined by the use of guinea pigs in vivo and their skin in vitro. Pyridostigmine has a possible use as a prophylactic against inhibit blood cholinesterase, producing effects observable in 30 minutes. Evidence of the storage of pyridostigmine in skin was found. The compound when crossing skin in vitro takes 1,000 minutes to reach an equilibrium rate. A permeability constant was estimated. The main problem remaining is the practical on of making a dosage form suitable for presenting the pyridostigmine at constant concentration to the skin for a long period. Author

**N82-21879#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Biodynamics and Bioengineering Div.
**F/FB-111 EJECTION EXPERIENCE (1967-1980). PART 1: EVALUATION AND RECOMMENDATIONS**
Bernard F. Hearon, James W. Brinkley, Ralph J. Luciani, and Henning E. VonGierke Nov. 1981 21 p refs
(AF Proj. 7231)
(AD-A110199; AFAMRL-TR-81-113) Avail: NTIS HC A02/MF A01 CSCL 06/19

A review of the accident investigation reports of all non-fatal F/FB-111 ejections which occurred from 19 October 1967 to 26 March 1980 was conducted. The available spinal radiographs of the ejectees were also reviewed. The overall vertebral fracture rate among survived ejectees in a properly functioning module was found to be 29.5% (23 of 78). There was no correlation of these fractures with negative inertia reel strap angles. Five radiologic and orthopedic consultants did not agree on the specific mechanism of vertebral fracture in the involved crewmembers. A significant reduction in the vertebral fracture rate appears achievable only by decreasing the acceleration stresses imposed on the crewmembers during landing impact. GRA

**N82-21880#** Northwestern Univ., Evanston, Ill. Dept. of Psychology.
**SOURCEBOOK OF TEMPORAL FACTORS AFFECTING INFORMATION TRANSFER FROM VISUAL DISPLAYS Final Report**
R. Sekuler, P. D. Tynan, and R. S. Kennedy, ed. (Canyon Research Group) Alexandria, Va. Army Research Institute for the Behavioral and Social Sciences 1 Jun. 1981 191 p refs
(Contract N61756-76-M-5961; DA Proj. 2Q1-62722-A-77)
(AD-A109907; ARI-TR-540) Avail: NTIS HC A09/MF A01 CSCL 06/16

Temporal factors in vision are reported. A literature and information search is included. An integrative review of the literature is provided which deals with application of findings to display design. Perception of temporal events - specifically motion perception (real and apparent) and flicker/flash sensitivity is examined. Temporally based phenomena which distort or degrade perception are covered. Features of these phenomena are observed in visual displays. Equations are provided for the calculation of design criteria (e.g., peripheral motion threshold, contrast thresholds, contrast thresholds and age, etc.). General guidelines are offered for incorporating design criteria into perceptions due to temporal events. E.A.K.

**N82-21881#** Stanford Univ., Calif. Dept. of Computer Science.
**SYMBOLIC REASONING AMONG 3-D MODELS AND 2-D IMAGES Ph.D. Thesis**
Rodney Allen Brooks Jun. 1981 98 p refs
(Contract MDA903-80-C-0102)
(AD-A110316; STAN-CS-81-861; AIM-343) Avail: NTIS HC A05/MF A01 CSCL 09/2

An implemented and operational model-based vision system is described. Examples are given of its interpretation of images, including extraction of three dimensional parameters from monocular images. Advances are presented in representation for geometric modeling of objects and objects classes, in techniques for manipulating non-linear symbolic algebraic constraints, in geometric reasoning in incompletely specified situations, and in constructing algebraic constraints from image measurements. Both generic object classes and specific objects are represented by volume models which are independent of viewpoint. Complex real world object classes are modeled. Variations in size, structure and spatial relations within object classes can be modeled. New spatial reasoning techniques are described which are useful both for prediction within a vision system, and for planning within a manipulation system. New approaches to prediction and interpretation are introduced, based on the propagation of symbolic constraints. Predictions are two-pronged. First, prediction graphs provide a coarse filter for hypothesizing matches of objects to image features. Second, prediction graphs contain instructions on how to use measurements of image features to deduce three dimensional information about tentative object interpretations. Interpretation proceeds by merging local hypothesized matches, subject to consistent derived implications about the size, structure and spatial configuration of the hypothesized objects. Prediction, description and interpretation proceed concurrently, from coarse object subpart and class interpretations of images, to fine distinctions among object subclasses, and more precise three dimensional quantification of objects. Author (GRA)

**N82-21882#** SRI International Corp., Menlo Park, Calif.
**PERCEPTION OF SPATIAL FEATURES WITH STEREOSCOPIC DISPLAYS Final Report, 1 Sep. 1979 - 30 Sep. 1981**
Thomas P. Piantanida 30 Nov. 1981 60 p
(Contract N00014-79-C-0742; SRI Proj. 8899; NR Proj. 196-162)
(AD-A110191; N14-0742-81C-0002) Avail: NTIS HC A04/MF A01 CSCL 14/5

Two levels of measurement were used in this investigation: subjective measures consisting of observer responses, and objective measures consisting of observer eye movements. Two major experimental techniques were used. These were the selectively stabilized image technique, in which part of the stimulus image was stabilized on the observer's retina; and a motion-in-depth technique that allowed us to measure changes in an observer's perception of three dimensional stimuli. The major findings of this study are: (1) the human stereo mechanisms responsible for the perception of depth and of motion-in-depth are sensitive to different aspects of the retinal images produced by three-dimensional displays than is the form perception mechanism; (2) it is possible to drive the human stereo mechanism with retinal images that do not drive the form perception mechanism; (3) observer variables such as ocular dominance and familiarity with three-dimensional displays interact with the three-dimensional display parameters (image luminance, image contrast, and interocular contrast), but appear not to influence the perception of motion-in-depth in three-dimensional displays during binocular image misregistration. Author

**N82-21883#** Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
**POTENTIAL FOR INTERACTION OF LOW-LEVEL IMPULSE AND CONTINUOUS NOISE**
Roger P. Hamernik, Donald Henderson, and Richard Salvi Wright-Patterson AFB, Ohio AMRL Mar. 1981 56 p refs
(Contract F33615-78-C-0513; AF Proj. 2312)
(AD-A109430 AFAMRL-TR-80-68) Avail: NTIS HC A04/MF A01 CSCL 06/19

The purpose of the experiments described in this report was to establish whether a synergistic interaction occurs between relatively low levels of continuous and impulse noise to produce an increased hearing loss and cochlear pathology. Twenty-three monaural chinchillas were used as experimental subjects. The animals were divided into six groups. Each group was exposed 8 hours per day for 8 weeks to various combinations of impulse and continuous noise presented at various levels. Using behavioral conditioning techniques, hearing thresholds were measured before, during, and after noise exposure. After a minimum of 30 days post-exposure the animals were killed and their cochleas were analyzed using the surface preparation technique. Histological results were qualified in the form of a cochleagram. In contrast to earlier findings the results of this study found no evidence of a synergistic interaction when the animals were exposed to a combination of continuous (between 75-85 dB SPL) and impulse (103 dB SPL peak exposure) noise. Author (GRA)

**N82-21884#** Royal Aircraft Establishment, Farnborough (England).
**HUMAN REACTION TO LOW FREQUENCY MOTION: PRELIMINARY STUDIES**
C. H. duRoss London HMSO 10 Nov. 1980 46 p refs
(RAE-TM-FS-365; BR77320) Avail: NTIS HC A03/MF A01

A ship motion simulator was used to ascertain the effects of low frequency ship and sinusoidal motion on man and his

performance. Ship motion signals based on those recorded at 25 knots into a force 4 wind were employed. Heave, pitch and roll sinusoidal motion in the 0.1 to 0.4 Hz frequency range occurred. A tracing task involving unsupported arm movements was seriously affected by the motion; a tracing task showed a small decrement in performance and a digit keying task was unaffected. There was no evidence that adverse effects were caused by motion sickness. Accelerations measured at the head and hand of subjects resulted in transmissibilities showing that relatively large rotational motions could be induced.
Author (ESA)

**N82-21885#** Defence Research Information Centre, Orpington (England).
**RECORDING BASIC CLIMATIC PARAMETERS AND THEIR PROCESSING INTO INTEGRATED HEAT STRESS INDICES**
G. Kleinhanss, C. Piekarski, and E. Haug Mar. 1981 33 p refs Transl. into ENGLISH from Biomedizinische Tech. (Germany), v. 25, no. 1-2 1980 p 12-26
(DRIC-T-6292; BR78677) Avail: NTIS HC A03/MF A01

A method of estimating heat stress and climatic strain on man is described. Mathematical compound values based on simultaneously recorded meteorological factors related to physiological strain in exposed human beings are used. A procedure is presented which simplifies and improves the previous method used for field testing environmental strain of the workplace. With the aid of the mathematical model, it is possible using a simple electronic calculator to calculate the stress from a number of selected heat stress indices.
Author (ESA)

**N82-21886#** Defence Research Information Centre, Orpington (England).
**ASPECTS OF THE BODY'S DEFENCE MECHANISMS AS PROTECTION AGAINST BIOLOGICAL AGENTS**
Gunilla Eriksson and Thomas Olsson Aug. 1981 14 p refs Transl. into ENGLISH of 'Naagra aspekter paa infektionsfoersvaret som skydd mot biologiska stridsmedel' (Stockholm)
(DRIC-T-6433; FOA-C-40094-B1; BR80179) Avail: NTIS HC A02/MF A01

Factors important in assessing the pathogenic powers of infectious microorganisms, and possible means of protection during biological warfare, were analyzed. Nonspecific defense mechanisms comprise: (1) mechanical protection, (skin, mucous membrane); (2) chemical factors, (antimicrobial substances); (3) inflammatory response, (increased circulation, etc); and (4) phagocytosis, (antimicrobial cell activity). The immune defenses, give specific, but not absolute, protection against infectious diseases. Effects of microorganisms against which there is no immune defense are restricted by antibiotics/chemotherapeutic drugs, and immunotherapy. Author (ESA)

**N82-21887#** Green (Del) Associates, Inc., San Diego, Calif.
**EFFECTS OF SHORT-TERM INTERMITTENT AIR POLLUTANTS ON INCIDENCE AND SEVERITY OF ACUTE RESPIRATORY DISEASE: DATA COLLECTION AND QUALITY ASSURANCE**
R. David Flesh, Margaret L. Riha, and Michelle F. Miller 1981 265 p
(Contract EPA-68-02-2749)
(PB82-129479; EPA-600/1-81-065) Avail: NTIS HC A12/MF A01 CSCL 06T

The purpose of this study was to measure the acute response of respiratory disease from peak hourly and daily average exposures to nitrogen dioxide alone and in combination with other pollutants. The study population was made up of families with children attending public elementary schools and living in four California South Coast Air Basin study areas: West Los Angeles/Santa Monica, Garden Grove/Westminister, Glendora/Covina, and Upland/Ontario. The role and responsibility of the contractor were to collect all background and health data, to process and assure the quality of the data and to prepare this report. Families were recruited for participation during the spring and summer months of 1978. Recruitment included face to face interviews for the purpose of collecting family background data. GRA

**N82-21888#** Washington Univ., St. Louis, Mo. Materials Research Lab.
**PHYSICAL TESTING OF POLYMERS FOR USE IN CIRCULATORY ASSIST DEVICES** Annual Report, 31 Aug. 1980 - 30 Aug. 1981
J. L. Kardos, W. M. Swenson, R. E. Clark, and C. Migliaresi 31 Aug. 1981 79 p refs
(Contract N01-HV-02910)
(PB82-127069; NIH-N01-HV-02910-1) Avail: NTIS HC A05/MF A01 CSCL 06K

The distribution of fatigue lifetimes under biaxial stress for elastomers was developed. For crack growth under uniaxial fatigue an increase in frequency yielded an almost linear decrease in fatigue life. The predicted lifetimes are shorter than those experimentally measured. Comparison of the time-temperature superposed (TTS) master creep compliance curves with the realtime, longterm creep at 37C indicates the real-time creep to be slightly higher than the TTS predictions. A linear viscoelastic analysis is developed to predict creep under superimposed static and dynamic uniaxial loadings. GRA

**N82-21889#** Professional Staff Association of the Rancho Los Amigos Hospital, Inc., Downey, Calif.
**DEVELOPMENT AND PERSISTENCE OF ADAPTATION TO OZONE EXPOSURE IN OZONE-SENSITIVE SOUTHERN CALIFORNIA RESIDENTS** Final Report
William S. Linn and Jack D. Hackney 20 Aug. 1981 33 p refs
(PB82-125899; CRC-APRAC-CAPM-31-79-1-80) Avail: NTIS HC A03/MF A01 CSCL 06E

Eleven healthy volunteer subjects believed to be atypically reactive to ozone were exposed to approximately 0.47 ppm ozone (ultraviolet calibration method) in purified air for four successive days to develop adaptation if possible. They were reexposed similarly once during each of the following five weeks to investigate the persistence of the adaptive response. Exposures lasted two hours and included stresses of heat and intermittent moderate exercise. Responses to ozone were assessed by forced expiratory lung function tests and by subjects' reports of symptoms. For the group as a whole, the time courses of lung function and symptom responses were very similar. For the typical subject in this group, adaptation was partially lost after four ozone-free days, and more or less completely lost after seven ozone-free days. GRA

**N82-21890#** Decision Research Corp., Eugene, Oreg.
**SUBJECTIVE CONFIDENCE IN FORECASTS**
Baruch Fischhoff and Don Macgregor Dec. 1981 48 p refs
(Contract N00014-80-C-0150)
(AD-A109730; PTR-1092-81-12) Avail: NTIS HC A03/MF A01 CSCL 05/10

To be useful, a forecast must not only predict the future, but also give some indication of how much confidence to place in that prediction. The appropriateness of people's confidence in their general knowledge has been studied extensively. After briefly reviewing that literature, the present article attempts to make it more directly relevant to forecasters by repeating previous studies in the context of confidence in forecasts. The most robust of previous results was strongly replicated: participants were greatly overconfident in their predictions when dealing with a fairly hard-to-predict set of events. A procedure that had previously proved effective in reducing overconfidence, forcing respondents to provide reasons why their answers might be wrong, was of minor value here. A new result was the discovery of a simple indicator of the quality of people's confidence assessments, whether they ever expressed certitude. Possible implications of these results for producing and using forecasts are discussed.
Author (GRA)

**N82-21891#** Decision Research Corp., Eugene, Oreg.
**DIAGNOSTICITY AND THE BASE-RATE EFFECT**
Baruch Fischhoff and Maya Bar-Hillel Nov. 1981 44 p refs
(Contract N00014-80-C-0150)
(AD-A109731; PTR-1092-81-11) Avail: NTIS HC A03/MF A01 CSCL 05/1

A common judgmental task involves predicting the category membership of an individual on the basis of information specific to that individual and background information regarding the base rate of different categories. According to statistical theory, predictions may deviate from base rates only to the extent that the individuating information is diagnostic. Previous research has demonstrated that diagnosticity is often judged by 'representativeness', the degree to which the individuating information is differentially suggestive of the different possible categories. Thus, information with high differential representativeness, even if it is worthless (e.g., because its sources are unreliable), will swamp base-rate information. The present studies varied differential representativeness by manipulating the degree to which the

prediction categories are similar to one another vis a vis the individuating information, and hence similarly represented by that individuating information. It was found that the effect of the base rate increased systematically as differential representativeness decreased. Representativeness was measured independently by several converging techniques. These measures predicted the magnitude of the base rate over entire sets of descriptions.
Author (GRA)

**N82-21892#** National Physical Lab., Teddington (England). Acoustics Unit.
**A STUDY OF THE EFFECTS OF FLUCTUATION FREQUENCY ON ADVERSE REACTIONS TO NOISE**
H. C. Fuller and D. W. Robinson Oct. 1980 28 p refs
(NPL-Ac-97; ISSN-0143-7143) Avail: NTIS HC A03/MF A01

The effects of the frequency of level fluctuations on the adverse reaction generated by a noise stimulus were investigated. As a result of theoretical considerations, it was suggested that the fluctuation term in the formula for noise pollution level should be weighted according to the frequency of the level fluctuations. Subjects completed a calculation task in a listening room, giving their response on a questionnaire. Test stimuli with levels varying by 10 dB and 20 dB with periods of between 6 and 600 sec were used and the adverse reaction generated after 10 min was measured. The results were examined in relation to the noise ratings L sub NP, L sub EG a measure of the rate of fluctuation of the level, and the proposed modification of L sub NP. None of the four measures fully explains the results, but there is some evidence to support the modification of L sub NP suggesting that only level fluctuations at frequencies between 0.1 Hz and 0.01 Hz contribute to the general adverse reaction.
Author (ESA)

**N82-21893#** Royal Naval Personnel Research Committee, London (England). Applied Psychology Unit.
**COGNITIVE PERFORMANCE, SLEEP QUALITY AND MOOD DURING DEEP OXY-HELIUM DIVING**
Vivien J. Lewis and Alan D. Baddeley Jan. 1981 32 p refs
(RPN-1/81) Avail: NTIS HC A03/MF A01

Five dives are reported, lasting between 18 and 26 days, and reaching maximum simulated depths of between 300 meters sea water (msw) and 540 msw. Tests of cognitive functioning, including associative and short term memory, arithmetic ability, perceptual speed, spatial manipulation, grammatical reasoning and semantic processing, were administered to well-practiced subjects prior to each dive, at maximum depth and again during decompression. Self-report measures of sleep and mood questionnaires were administered for a period extending from one week before each dive commenced until at least one week after the dive was completed. The results indicate significant impairments in all performance tasks at maximum depth, except for the tests of associative memory and grammatical reasoning. A significant reduction in sleep and decrease in the subjective level of alertness is found at maximum depth for all dives.
Author (ESA)

**N82-21894*#** Stanford Univ., Calif. Biomedical Technology Transfer Program.
**MOBILITY AID FOR THE BLIND Final Report, 1 Dec. 1980 - 30 Nov. 1981**
Jan. 1982 40 p refs
(Contract NCC2-113)
(NASA-CR-168731; NAS 1.26:168731) Avail: NTIS HC A03/MF A01 CSCL 05H

A project to develop an effective mobility aid for blind pedestrians which acquires consecutive images of the scenes before a moving pedestrian, which locates and identifies the pedestrian's path and potential obstacles in the path, which presents path and obstacle information to the pedestrian, and which operates in real-time is discussed. The mobility aid has three principal components: an image acquisition system, an image interpretation system, and an information presentation system. The image acquisition system consists of a miniature, solid-state TV camera which transforms the scene before the blind pedestrian into an image which can be received by the image interpretation system. The image interpretation system is implemented on a microprocessor which has been programmed to execute real-time feature extraction and scene analysis algorithms for locating and identifying the pedestrian's path and potential obstacles. Identity and location information is presented to the pedestrian by means of tactile coding and machine-generated speech.
R.J.F.

**N82-21895*#** Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
**SENSITIVITY ANALYSIS AS AN AID IN MODELLING AND CONTROL OF (POORLY-DEFINED) ECOLOGICAL SYSTEMS**
G. M. Hornberger and E. B. Rastetter Mar. 1982 23 p refs
(NASA Order A-77478)
(NASA-CR-166308; NAS 1.26:166308) Avail: NTIS HC A02/MF A01 CSCL 13B

A literature review of the use of sensitivity analyses in modelling nonlinear, ill-defined systems, such as ecological interactions is presented. Discussions of previous work, and a proposed scheme for generalized sensitivity analysis applicable to ill-defined systems are included. This scheme considers classes of mathematical models, problem-defining behavior, analysis procedures (especially the use of Monte-Carlo methods), sensitivity ranking of parameters, and extension to control system design.
N.W.

**N82-21896*#** National Bureau of Standards, Washington, D.C. Industrial Systems Div.
**AN OVERVIEW OF ARTIFICIAL INTELLIGENCE AND ROBOTICS. VOLUME 2: ROBOTICS**
William B. Gevarter Mar. 1982 102 p refs
(NASA-CR-168727; NAS 1.26:168727; NBSIR-82-2479) Avail: NTIS HC A06/MF A01 CSCL 05H

The field of robotics is reviewed. Primitive functions are discussed. Manipulator arms are considered. Actuators are examined. Mobility, end effectors, control, and sensor-controlled robots are covered. Robot vision is discussed, covering determination of pose, feature extraction, object recognition, and future techniques. Programming is addressed. Kinematics and dynamics are considered. Research requirements are taken up. Commercially available robots, vision systems, and other components are discussed. Information sources are provided. N.W.

**N82-21897*#** Children's Hospital at Stanford, Palo Alto, Calif. Rehabilitation Engineering Center.
**RESEARCH AND DEVELOPMENT OF A VERSATILE PORTABLE SPEECH PROSTHESIS Final Report**
Nov. 1981 82 p refs
(NsG-2313)
(NASA-CR-168741; NAS 1.26:168741) Avail: NTIS HC A05/MF A01 CSCL 05H

The Versatile Portable Speech Prosthesis (VPSP), a synthetic speech output communication aid for non-speaking people is described. It was intended initially for severely physically limited people with cerebral palsy who are in electric wheelchairs. Hence, it was designed to be placed on a wheelchair and powered from a wheelchair battery. It can easily be separated from the wheelchair. The VPSP is versatile because it is designed to accept any means of single switch, multiple switch, or keyboard control which physically limited people have the ability to use. It is portable because it is mounted on and can go with the electric wheelchair. It is a speech prosthesis, obviously, because it speaks with a synthetic voice for people unable to speak with their own voices. Both hardware and software are described. R.J.F.

**N82-21898#** Oceanautics Inc., Annapolis, Md.
**HUMAN ENGINEERING GUIDES TO DESIGN OF DISPLAYS FOR UNDERWATER APPLICATIONS**
W. S. Vaughan, Jr. and J. A. S. Kinney (Naval Submarine Medical Research Lab.) Dec. 1981 40 p
(Contract N00014-79-C-0802; NR Proj. 196-157)
(AD-A110317) Avail: NTIS HC A03/MF A01 CSCL 05/5

This report contains recommendations for designers of displays for systems that operate underwater. The recommendations are based on a foundation of research and analyses contained in a companion document (Vaughan and Kinney, 1980). Both the current report and the database document are organized by designer decisions related to the legibility of panel displays and to the visibility of painted objects. Five decisions comprise the content organization of the report: eye-to-console distance, symbol size, display luminance, peripheral location, and use of color. Material presented within each section serves first, to provide a rationale for the significance of human factor considerations to the decision; second, to provide necessary translations of scientific concepts into engineering concepts; third, to state concise recommendations for how to resolve the design issue from the viewpoint of human factors. GRA

**N82-21899#** Defence Research Information Centre, Orpington (England).

### CONCEPTUAL ERGONOMICS: EARLY DETECTION OF FIELD OF VISION RESTRICTIONS BY MEANS OF ERGOSCOPY

H. J. Windberg London HMSO Nov. 1980 16 p refs Transl. into ENGLISH of ERGONOMICS, v. 23, no. 4, 1980 p 341-350
(DRIC-T-6253; BR76774) Avail: NTIS HC A02/MF A01

A photographic apparatus based on the endoscope for determining the field of vision from control positions using scale models is described. Called ergoscopy, the technique uses a pipe with an optical system and a flexible optical conductor cable fitted to a camera. The ergoscope allows the designer to investigate sight angles of operators and recognize hindrances by simulating critical conditions with small scale models. Design mistakes may therefore be eliminated before the 1:1 scale prototype is built. Illustrations with 1:20 and 1:100 models are given. Author (ESA)

**N82-21900#** Royal Aircraft Establishment, Farnborough (England).

### REPORT ON A VISIT TO CANADA OF THE 10-17 MAY 1980 SECOND INTERNATIONAL SYMPOSIUM ON PERSONAL HEARING PROTECTION IN INDUSTRY

J. A. Chillery London HMSO 29 Jan. 1981 24 p Conference held at Toronto, 14-16 May 1980
(RAE-TM-FS-377; BR78127) Copyright. Avail: NTIS HC A02/MF A01

Material presented at the symposium is summarized and evaluated. Several papers cover the testing of protectors, their design and performance, including the objective measurement of ear-plug attenuation, and the miniature microphone method of measuring ear-muff attenuation. Other papers describe an active noise reduction system, correlation between objective and subjective data, correlation between laboratory and field data, and the measurement of headband force. Author (ESA)

**N82-21901#** Royal Aircraft Establishment, Farnborough (England).

### MEASUREMENT OF THE HEADBAND FORCE OF CIRCUMAURAL HEARING PROTECTORS

J. A. Chillery London HMSO 5 Feb. 1981 25 p refs Presented at Inaugural Tech. Meeting of Can. Acoust. Soc., Toronto, 12 May 1980
(RAE-TM-FS-378; BR78249) Avail: NTIS HC A02/MF A01

Circumaural hearing protector design is summarized. Existing force meters for the measurement of the headband force of such protectors are assessed. The construction and preliminary testing of a reliable method for measuring the force with which the protector cups of an earmuff are pressed against the head of a wearer are described together with the necessary modifications, such as changes in dimensions, to enable the device to fit inside, and support, a flight helmet. Author (ESA)

**N82-21902#** Royal Aircraft Establishment, Farnborough (England).

### A TEST FACILITY FOR THE OBJECTIVE MEASUREMENT OF CIRCUMAURAL HEARING PROTECTOR ATTENUATION

J. A. Chillery London HMSO 5 Feb. 1981 33 p refs Presented at 2nd Intern. Symp. on Personal Hearing Protect. in Ind., Toronto, 14-16 May 1980
(RAE-TM-FS-379; BR78126) Avail: NTIS HC A03/MF A01

The development of a facility suitable for quality control work is developed. Published data were surveyed to identify the relative importance of parameters of a protector and the head of a wearer. The most important are the attenuation values of different ear geometries, reproducible leakage simulation and the effect on attenuation values of different types of skin and flesh. The construction of an artificial head and of testing equipment are described. Important factors are high acoustic isolation and simplicity of use. The performance of the device, using various test and sound fields and procedures, was examined. It is found that reliable data are generated. A pilot study on one example of protector is described. Author (ESA)

**N82-21903#** Royal Aircraft Establishment, Farnborough (England).

### THE IMPORTANCE OF EAR-LIKE COUPLERS IN THE DESIGN OF AN OBJECTIVE TEST FACILITY FOR THE MEASUREMENT OF EARMUFF INSERTION LOSS

J. A. Chillery Jan. 1981 24 p refs Presented at 2nd Intern. Symp. on Personal Hearing Protection in Industry, Toronto, 14 May 1980
(RAE-TM-FS-380; BR78125) Avail: NTIS HC A02/MF A01

An objective method of earmuff attenuation measurement is outlined. Experiments were performed on an electronic manikin, a prototype artificial head, and two ear-like couplers. These show that the acoustic behavior of the ear canal and middle-ear is unaffected by a protector covering the outer ear. It is therefore unnecessary to include a simulation of an ear canal or an ear-like coupler in an objective test facility for measuring insertion loss. Data are presented which show that, for insertion loss measurements, the attenuation spectra produced by an objective method are practically independent of the method of acoustically coupling the measuring microphone to the volume contained by the earmuff. This simplifies the design of the objective method. Author (ESA)

**N82-21904#** Motor Industry Research Association, Lindley (England).

### ANTHROPOMETRIC PROFILE OF THE BRITISH CAR OCCUPANT

C. M. Haslegrave and R. N. Hardy 1979 76 p refs Sponsored in part by MEMTRB
(MIRA-1979/2) Avail: NTIS HC A05/MF A01

British car drivers and front seat passengers were anthropometrically surveyed. Seventeen dimensions required in the design of cars were measured. The dimension distributions of the male and female driving populations show variations with age, stature and weight. No significant difference is found between female occupants of either front seat, but male drivers are found to be significantly older and heavier than male passengers, although there was little difference in stature. Comparison with the dimensions of the US civilian population show that where male dimensions are based on American statistics they are adequate for the present British driving population, however, British female drivers are significantly taller than US women. A factor analysis is used to explore the relationships between dimensions relevant to vehicle design. Three factors are used to construct a set of body indices which are suggested as shape parameters in the definition of a range of anthropometric dummies and models. Author (ESA)

**N82-21905#** Prins Maurits Lab. TNO, Rijswijk (Netherlands). Inst. for Chemical and Technological Research.

### EVALUATION OF THE NBC OVERGARMENTS MANUFACTURED BY SEYNTEX BELGIUM

J. Medema May 1980 19 p ref
(Contracts A78/KL/106; A77/KL/061)
(PML-1980-33; TDCK-73841) Avail: NTIS HC A02/MF A01

A protective clothing system against chemical warfare agents (liquid and vapor) was evaluated. The suit was exposed to a simulated spray attack of mustard gas droplets. The suit was used in combination with ordinary combat clothing in penetration cells. Protection time is defined as the time in which four micrograms/cu cm cloud penetrate. Protection was measured after: (1) outdoor exposure, including rain; (2) 12 hr cycling sweat poisoning tests; (3) 5 years storage; (4) accelerated aging; (5) and 120 passes over an obstacle course. No serious degradation of protection is reported. Author (ESA)

**N82-21906#** Technical Research Centre of Finland, Espoo. Electrical Engineering Lab.

### GUIDELINES FOR MAN-MACHINE INTERFACE DESIGN

Jukka Ranta, Bjoern Wahlstroem, and Rolf Westesson Aug. 1981 135 p refs
(VTT-RR-23/81; ISBN-951-38-1279-0; ISSN-0358-5077)
Avail: NTIS HC A07/MF A01

Guidelines applicable to the design stage of complex process automation systems were designed. Three decision making levels are discerned: (1) decisions are made concerning the launching of the project; general outlines and criteria for later phases are created; (2) the degree of automation, basic interface design, coding system, instrumentation, and procedures are decided; (3) the practical implementation of specified subareas, control system parameter design, or instrumentation scale design. The guidelines ensure that factors affecting decision making are taken into account at each level. Author (ESA)

# SUBJECT INDEX

**AEROSPACE MEDICINE AND BIOLOGY** / *A Continuing Bibliography (Suppl. 234)*

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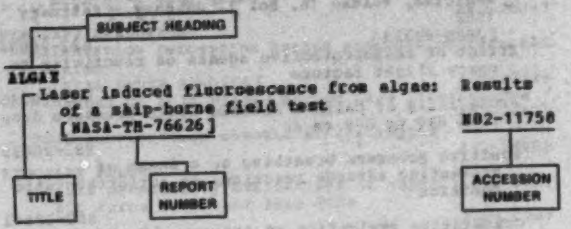

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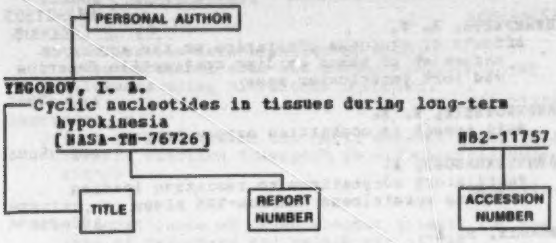

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 235)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in July 1982 in

- *Scientific and Technical Aerospace Reports (STAR)*
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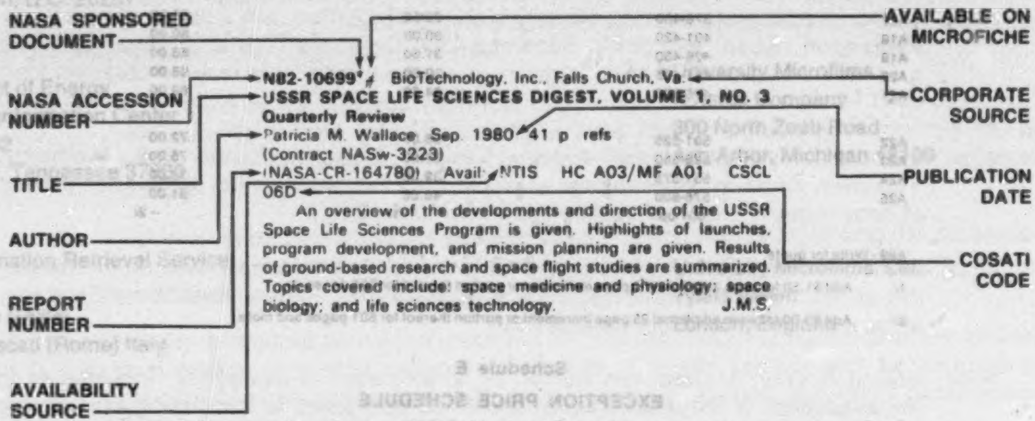
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**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3 Quarterly Review**
Patricia M. Wallace Sep. 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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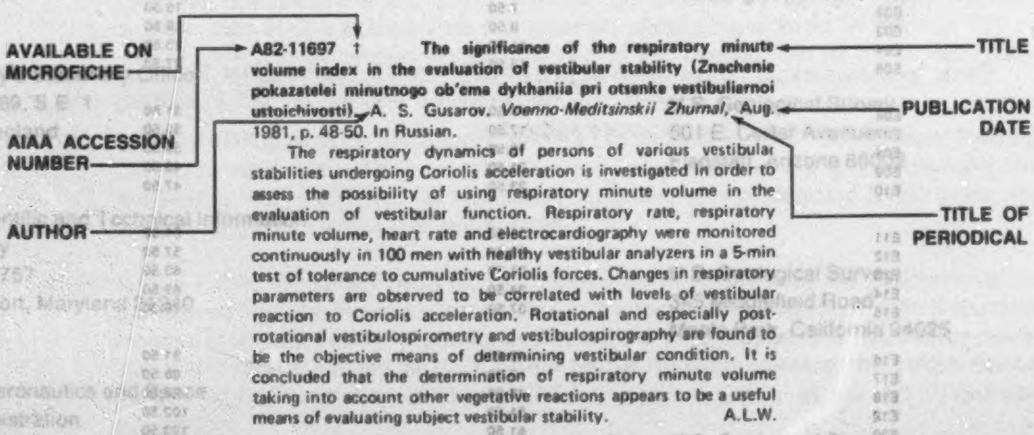
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The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

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AUGUST 1982

## IAA ENTRIES

**A82-28606** **Mass mortality and its environmental and evolutionary consequences.** K. J. Hsü, Q. He, J. A. McKenzie, H. Weissert, K. Perch-Nielsen, H. Oberhänsli, K. Kelts (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland), J. LaBrecque, L. Tauxe (Lamont-Doherty Geological Observatory, Palisades, NY), and U. Krähenbühl (Bern, Universität, Berne, Switzerland). *Science,* vol. 216, Apr. 16, 1982, p. 249-256. 46 refs. Swiss National Science Foundation Grant No. 2,650,0,80; NSF Grant No. OCE-81-19695.

The latest Mesozoic and earliest Tertiary sediments at Deep Sea Drilling Project site 524 provide an amplified record of environmental and biostratographic changes at the end of the Cretaceous. Closely spaced samples, representing time intervals as short as 100 or 1000 years, were analyzed for their bulk carbonate and trace-metal compositions, and for oxygen and carbon isotopic compositions. The data indicate that at the end of the Cretaceous, when a high proportion of the ocean's planktic organisms were eliminated, an associated reduction in productivity led to a partial transfer of dissolved carbon dioxide from the oceans to the atmosphere. This resulted in a large increase of the atmospheric carbon dioxide during the next 50,000 years, which is believed to have caused a temperature rise revealed by the oxygen-isotope data. The data indicate that many of the Cretaceous pelagic organisms became extinct over a period of a few tens of thousands of years, and do not contradict the scenario of cometary impact as a cause of mass mortality in the oceans, as suggested by an iridium anomaly at the Cretaceous-Tertiary boundary. (Author)

**A82-28925** # **Fuselage lights as a cause factor of vertigo in night formation flight - Perceiving pattern of fuselage light.** Z. Katoh (Japan Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports,* vol. 22, Sept. 1981, p. 125-142. 25 refs. In Japanese, with abstract in English.

**A82-29153** **A mathematical model of the dynamics of the inner ear.** M. H. Holmes (Rensselaer Polytechnic Institute, Troy, NY). *Journal of Fluid Mechanics,* vol. 116, Mar. 1982, p. 59-75. 14 refs.

A three-dimensional hydroelastic model of the dynamical motion in the cochlea is analyzed. The fluid is Newtonian and incompressible, and the basilar membrane is modelled as an orthotropic elastic plate. Asymptotic expansions are introduced, based on slender-body theory and the relative high frequencies in the hearing range, which reduce the problem to an eigenvalue problem in the transverse cross-section. After this, an example is worked out and a comparison is made with experiment and the earlier low-frequency theory. (Author)

**A82-29168** **A comparison of models to predict annoyance reactions to noise from mixed sources.** S. M. Taylor (McMaster University, Hamilton, Ontario, Canada). *Journal of Sound and Vibration,* vol. 81, Mar. 8, 1982, p. 123-138. 25 refs. Research supported by the Social Sciences and Humanities Research Council of Canada.

Many residential communities are exposed to environmental noise from a mixture of sources. A simple energy summation model provides a convenient method for predicting annoyance reactions in mixed source situations but there is research evidence that the validity of its application is questionable. In this paper various alternative models are discussed. Their predictive powers are compared by using noise and social survey data collected at residential sites in the vicinity of Toronto International Airport. Sites were purposely selected to represent a range of aircraft and road traffic noise combinations. Of the five models examined, the simple energy summation model gives the poorest prediction of average annoyance. The strongest predictions are achieved by using independent effects and energy difference models. The implications of the results for predicting annoyance reactions to mixed sources are considered. (Author)

**A82-29255** **An evaluation of the Nimrod Maritime Crew Trainer - A case study.** A. G. Parfitt (Ministry of Defence, London, England). *Aeronautical Journal,* vol. 86, Mar. 1982, p. 86-89.

A description is given of the approach adopted and experience gained in the RAF Maritime Crew Trainer for the Nimrod MR1 aircraft, with attention to methodological and practical problems encountered. The Nimrod long-range maritime patrol and ASW aircraft is extensively equipped with electronic and acoustic sensors, and its simulator complex comprises two parts: (1) a dynamic simulator, which provides full flight deck simulation for two pilots and flight engineer and incorporates a three-degree-of-freedom motion system, and (2) the maritime crew trainer, which replicates the tactical compartment of the rear fuselage. The two parts may be operated independently or linked together. The areas for assessment of the simulations conducted included communications, tactical planning and tactical plan execution, on-task reactions, and crew cooperation. The two experimental variables were exercise frequency, and the provision of additional feedback to crews regarding their performance. O.C.

**A82-29256** **An evaluation of some experimental data on the cost effectiveness of flight simulators.** C. G. Durose (RAF, Support Command, Brampton, Cumb., England). *Aeronautical Journal,* vol. 86, Mar. 1982, p. 90-93. 6 refs.

The Incremental Transfer Effectiveness Function (ITEF) method for the measurement of flight simulator training effectiveness is discussed in light of two studies, by Povenmire and Roscoe (1973) and Bickley (1980), which employed it. A realistic mathematical function is fitted to the data reported in the former study, and total training cost sensitivity is investigated. Explanations are given for the successes and difficulties encountered in the attempt to obtain actual RAF aircraft and simulator operating costs. It is recommended that future studies along the lines of Povenmire and Roscoe obtain accurate operating costs, and identify cost effective training mixes and investigate the sensitivity of total training cost to changes in the optimum mix. O.C.

**A82-29257** **The role of information feedback in aircrew training and its impact on the debriefing facilities.** W. L. Waag (RAF Support Command, Brampton, Cumb., England). *Aeronautical Journal,* vol. 86, Mar. 1982, p. 94-96.

The role of information feedback in aircrew training is discussed, with attention to the need for improved computer-based debriefing aids. Such debriefing systems must be able to recreate the salient events of a simulated sortie in an off-line mode, requiring no additional simulator time, and include crew actions, aircraft and systems responses to those actions, and the relationship of the simulated aircraft to its operational environment. In addition, the off-line replay facility should offer a range of data representation options involving both alphanumeric and graphic formats, and give the operating instructor the greatest possible flexibility in the selection and treatment of those portions of the sortie that he wishes to debrief, with freezes, speed-ups and slow-downs of the simulation. O.C.

**A82-29266** **The medical and public health challenge of space.** O. H. Loyd and K. J. O'Brien (Johns Hopkins University, Baltimore, MD). *Spaceflight*, vol. 24, May 1982, p. 205-207. 34 refs.

It is pointed out that the acquisition, monitoring, and interpretation of physiological processes during flight have generated many technical improvements in the quality and quantity of health care. The satellite monitoring of crops, ecological change, weather, and air and sea pollution is also cited as a tangible health benefit. Space biomedical research has led to laser surgical techniques, computer imaging, and the miniaturization of biomedical sensors. It is predicted that at medical facilities in space, which will be unencumbered by gravity and surrounded by the ultimate vacuum, new drugs, new medical and surgical techniques, and new research discoveries will occur. C.R.

**A82-29432** † **The mechanism of the interaction of the triplet state of porphyrins and phthalocyanines with electron acceptors (O mekhanizme vzaimodeistviia tripletnogo sostoianiia porfirinov i ftalotsianinov s aktseptorami elektrona).** I. V. Renge, V. A. Kuz'min, A. F. Mironov, and Iu. E. Borisevich (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki; Moskovskii Institut Tonkoi Khimicheskoi Tekhnologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, Mar.-Apr. 1982, p. 143-146. 14 refs. In Russian.

**A82-29433** † **Structural features of the receptor cells of the saccular macula of the common frog (Strukturnye osobennosti retseptornykh kletok sakkuliarnoi makuly travianoi liagushki).** L. I. Tikhomirova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, Mar.-Apr. 1982, p. 197-200. 8 refs. In Russian.

**A82-29434** † **The interaction of actin with phosphorylase kinase (Vzaimodeistvie aktina s kinazoi fosforilazy).** B. F. Poglazov, N. B. Livanova, and M. V. Ostrovskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, Mar.-Apr. 1982, p. 221-224. 15 refs. In Russian.

An experimental study was performed to examine the effects of actin from rabbit skeletal muscles on the activity of phosphorylase kinase from rabbit muscles and liver. The results indicate that actin is a polyfunctional protein and is not only connected with the motor mechanism but has a more general significance in that it is a regulator of metabolic processes. In this regard, the polymerization capacity of actin is very important, since it makes possible a fine regulation of the quantity of its active form. B.J.

**A82-29440** † **Effects of reduced motor activity and water regimen on the growth of animals and their skeletal musculature (Vliianie ponizhennoi dvigatel'noi aktivnosti i vodnogo rezhima na rost zhivotnykh i ikh skeletnoi muskulatury).** E. V. Kocherezhkina (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 457-459. 8 refs. In Russian.

**A82-29441** † **Sensing of the proton potential /Delta mu H/ in Halobacterium halobium (Retseptsiia protonnogo potentsiala /Delta mu H/ u Halobacterium halobium).** V. A. Baryshev, A. N. Glagolev, and V. P. Skulachev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 475-479. 15 refs. In Russian.

**A82-29442** † **Linear dichroism of absorption changes upon the photoreduction of pheophytin in oriented preparations of photosystem II (Lineinyi dikhroizm izmenenii pogloshcheniia pri fotovosstanovlenii feofitina v orientirovannykh preparatakh fotosistemy II).** I. B. Ganago, V. V. Klimov, A. O. Ganago, V. A. Shuvalov, and Iu. E. Erokhin (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 479-483. 15 refs. In Russian.

The linear dichroism of the light-induced changes in absorption observed upon the photoreduction of pheophytin, the primary electron acceptor in photosystem II reaction centers, in oriented subchroloroplast particles is measured in a study of the orientation of the transition dipole moment of the pigment. Absorption spectra of subchloroplast particles enriched in photosystem II and oriented in a polyacrylamide gel were determined using a beam of linearly polarized light oriented parallel and perpendicular to the extension axis of the gel. Comparison of the absorption spectra for chlororplasts containing reversibly photoreduced pheophytin reveals the presence of two spectral components, corresponding to the reduction of pheophytin to the anion radical and to a shortwave shift in the maximum of chlorophyll absorption. The transition dipole moment of the longwave absorption band of pheophytin is deduced to be nearly perpendicular to the thylakoid membrane, while that of the 545-nm band is nearly parallel to the membrane. A.L.W.

**A82-29443** † **Orientation of Ca/2+/-dependent ATPases in sarcoplasmic reticulum membranes and reconstructed proteoliposomes (Orientatsiia Ca/2+/-zavisimoi ATFazy v membranakh sarkoplazmaticheskogo retikuluma i v rekonstruirovannykh proteoliposomakh).** V. B. Ritov, M. K. Murzakhmetova, and N. S. Shcherbakova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 483-487. 15 refs. In Russian.

**A82-29444** † **The interaction of tubulin with G-actin (Vzaimodeistvie tubulina s G-aktinom).** A. B. Verkhovskii, I. G. Surgucheva, V. I. Gel'fand, and V. A. Rozenblat (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 488-490. 15 refs. In Russian.

The presence of actin-binding proteins in nonmuscular cells is investigated by means of affinity chromatography. Depolymerized actin from the skeletal muscle of the rabbit was immobilized on activated CNBr sepharose, then a solution of homogenized cattle brain extract was applied to the column. Elution of column-bound fractions with formamide produced fractions identified as tubulin as well as actin and other proteins. Purified tubulin is also found to interact with actin in solution, giving rise to a rapidly sedimenting form of actin. Results suggest the possibility of interactions between cellular microtubles, which are composed primarily of tubulin, and microfilaments, composed of actin. A.L.W.

**A82-29445** † **New data on reverse electron transport in the respiratory chains of yeast mitochondria - The induction of reverse transport by exogenous NAD-H (Novye dannye ob obratnom perenose elektronov v dykhatel'noi tsepi drozhzhevykh mitokhondrii - Induktsiia obratnogo perenosa ekzogennym NAD-H).** R. A. Zviagil'skaia, V. A. Zelenshchikova, D. Sh. Burbaev, and A. V. Kotel'nikova (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 491-493. 8 refs. In Russian.

**A82-29446** † **Principles of enzyme stabilization - Polyacrylamide-gel-immobilized trypsin and chymotrypsin with high catalytic activity at elevated temperatures (Printsipy stabilizatsii fermentov - Immobilizovannye v poliakrilamidnom gele tripsin i khimotripsin, obladaiushchie vysokoi kataliticheskoi aktivnost'iu pri povyshennykh temperaturakh).** K. Martinek, V. A. Shikshnis, V. V. Mozhaev, I. V. Berezin, V. N. Smirnov, and V. P. Torchilin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 494-497. 15 refs. In Russian.

**A82-29447** † **Change in protein-lipid interactions upon the peroxide oxidation of blood serum lipoproteins (Izmenenie belok-lipidnykh vzaimodeistvii pri perekisnom okislenii lipoproteidov syvorotki krovi).** V. E. Formaziuk, Iu. G. Osis, A. I. Deev, V. Z. Lankin, A. M. Vikhert, and Iu. A. Vladimirov (II Moskovskii Meditsinskii Institut; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 497-500. 14 refs. In Russian.

**A82-29448** † **Electrical stimulation of the exterior geniculate body induces eye movements (Elektricheskaia stimuliatsiia naruzhnogo kolenchatogo tela vyzyvaet dvizheniia glaz).** V. Ia. Svetlova, G. I. Novikov, and N. F. Podvigin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 263, no. 2, 1982, p. 507-509. 5 refs. In Russian.

**A82-29469** † **A stochastic model of a human operator in the manual control of a dynamic system (Ob odnoi stokhasticheskoi modeli cheloveka-operatora v konture ruchnogo upravleniia dinamicheskim ob'ektom).** I. V. Kurochkin and A. A. Mal'tsev (Gor'kovskii Gosudarstvennyi Universitet, Gorki, USSR). *Radiofizika*, vol. 25, no. 1, 1982, p. 60-70. 11 refs. In Russian.

A stochastic model of a manual control loop is proposed which assumes that the human operator (operating like a Kalman filter) can, within certain limits, adapt the gain coefficient and the time constant of the neuromuscular system to the parameters of the dynamic system and the environment. It is also assumed that the selection by the operator of the optimal parameters of the neuromuscular system is accomplished in accordance with the operator's proper functional performance criterion, which reflects requirements imposed on the stabilization of the system coordinates, the intensity of the operator's controlling actions, and the total control-related energy expenditure of the loop. The statistically optimal stabilization of a first-order dynamic system is considered as an example. B.J.

**A82-29551** **Chylomicron triglyceride metabolism in resting and exercising fed dogs.** R. L. Terjung, L. Budohoski, K. Nazar, A. Kobryn, and H. Kaciuba-Uscilko (Polish Academy of Sciences, Medical Research Centre, Warsaw, Poland). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 815-820. 23 refs.

Plasma triglyceride turnover and tissue uptake during periods of moderate exercise is investigated in dogs performing treadmill exercise after eating a meal high in corn oil. Plasma triglyceride turnovers were determined from the loss from the circulating plasma of (C-14)-palmitic acid-labeled chylomicron triglycerides injected prior to a 60-min treadmill run. Both during exercise and at rest, labeled triglyceride removal from the blood is found to conform to first-order kinetics, although the fractional removal rate was slightly greater during exercise. Fat and muscle biopsies show that, during rest, the uptake of the triglyceride by fat tissue was nearly five times greater than that by muscle, while during exercise triglyceride uptake was very similar in muscle and fat due to a significant increase in muscle uptake and a large but insignificant decrease in uptake by fat. Results suggest that circulating triglycerides could represent a potential source of fatty acids for beta oxidation in working muscle. A.L.W.

**A82-29552** **Respiratory muscle fatigue after marathon running.** J. Loke, D. A. Mahler, and J. A. Virgulto (Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 821-824. 27 refs.

The present investigation has the objective to evaluate respiratory muscle function in runners before and after completion of a marathon race. Respiratory muscle strength was assessed by measuring maximal inspiratory and expiratory pressures and transdiaphragmatic pressure during inspiratory capacity. Endurance of the respiratory system was determined by measuring maximal voluntary ventilation. Four healthy male subjects were used in the study. The results demonstrate that both strength and endurance characteristics of the respiratory muscles were decreased following completion of a marathon race. Although the mechanism for these changes is unclear, it is likely that the development of respiratory muscle fatigue may represent a more general muscular fatigue experienced with endurance exercise. G.R.

**A82-29553** **Acclimatization to dry heat - Active men vs. active women.** D. H. Horstman and E. Christensen (U.S. Army, Research Institute of Environmental Medicine, Natick, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 825-831. 26 refs.

Six male and four female volunteers, who were unacclimatized to heat, served as subjects for the considered study. It was found that active women perform exercise of equal relative intensity in dry heat as well as active men. Moreover, active women acclimatized to exercise of equal relative intensity in dry heat at a faster rate to a greater extent than did active men. Ventilatory, metabolic, and cardiovascular differences between the sexes were minimal, and these measures were relatively stable throughout exercise on each day and among the days of acclimatization. Changes in plasma volume did not play a role in the acclimatization process for these active subjects. G.R.

**A82-29554** **Respiratory mechanics of a small carnivore - The ferret.** A. Vinegar, E. E. Sinnett, and P. C. Kosch (Harvard University, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 832-837. 19 refs. Grants No. NIH-HL-07118; No. NIH-HL-17382.

**A82-29555** **Thermal insulation and shivering threshold in Greek sponge divers.** A. Veicsteinas (Milano, Università, Milan, Italy) and D. W. Rennie (New York, State University, Buffalo, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 845-850. 17 refs. Research supported by the Consiglio Nazionale delle Ricerche; Grant No. NIH-P01-HL-14414.

**A82-29556** **Sparing effect of chronic high-altitude exposure on muscle glycogen utilization.** A. J. Young, W. J. Evans, A. Cymerman, K. B. Pandolf, J. J. Knapik, and J. T. Maher (U.S. Army, Research Institute of Environmental Medicine, Natick; Boston University, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 857-862. 31 refs.

The results of the discussed investigation indicate that after chronic altitude exposure, there is increased mobilization and utilization of free fatty acids (FFA) during exercise with associated sparing of muscle glycogen. These changes in metabolism during exercise may account for large increases in endurance observed during the first weeks at high altitude. Additional studies are recommended to determine whether this adaptation persists upon return to sea level. Eight healthy male soldiers participated in the investigation as subjects. Attention is given to resting serum FFA, serum lactate, glycerol, and aspects of glycogen utilization. G.R.

**A82-29557** **Role of the carotid chemoreceptors in regulation of inspiratory onset.** G. Bowes, S. M. Andrey, L. F. Kozar, and E. A. Phillipson (Toronto, University, Toronto, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 863-868. 30 refs. Medical Research Council of Canada Grant No. MT-4606.

The present investigation has the objective to demonstrate the ability of the carotid chemoreceptors to mediate independent changes in expiratory time in the unanesthetized, spontaneously breathing dog. It is found that during vagal blockade a transient CO2 stimulus of small magnitude is able to advance the onset of inspiration and thus shorten expiratory time, independent of changes in tidal volume or inspiratory time. It is further shown that this effect is abolished following carotid body denervation. Five dogs were used in the investigation. The dogs had been prepared previously with both a permanent side-hole tracheostomy and bilateral cervical vagal loops. G.R.

**A82-29558** **Determination of the anaerobic threshold by a noninvasive field test in runners.** F. Conconi, M. Ferrari, P. G. Ziglio, P. Droghetti, and L. Codeca (Ferrara, Università; Arcispedale Sant'Anna, Ferrara, Italy). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 869-873. 26 refs.

**A82-29559** **Effect of upper body posture on forced inspiration and expiration.** F. Haas, M. Simnowitz, K. Axen, D. Gaudino, and A. Haas (New York University, New York, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Apr. 1982, p. 879-886. 28 refs. U.S. Rehabilitation Services Administration Grant No. 16-P-56081/2.

**A82-29560** **Time course of ultrastructural changes in skeletal muscle after two types of exercise.** M. A. Nimmo and D. H.

Snow (Glasgow, University, Glasgow, Scotland). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 910-913. 19 refs. Research supported by the Horserace Betting Levy Board.

To ascertain the effects of sprint and endurance exercise on the time course of skeletal muscle mitochondrial changes, an ultrastructural study was conducted on four Thoroughbred horses. Skeletal muscle biopsies were taken at various intervals during and after the exercise. Transient mitochondrial alterations of varying degrees were observed following both types of exercise and were considered to be related to the development of fatigue. The degree of distortion of mitochondrial structure is considered not to represent the in vivo condition but the state of responsiveness to the fixation medium. (Author)

**A82-29561** **Delayed kinetics of respiratory gas exchange in the transition from prior exercise.** R. L. Hughson and M. Morrissey (Waterloo, University, Waterloo, Ontario, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 921-929. 30 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada.

**A82-29562** **Hemodynamic responses to methoxamine in exercise-conditioned and aorta-constricted rats.** E. M. Hasser, R. T. Dowell, and J. L. Haithcoat (Oklahoma, University, Oklahoma City, OK). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 967-975. 28 refs. Grants No. NIH-HL-23025; No. NIH-HD-13127; No. NIH-HL-07430.

The results of the reported experiments illustrate the divergent hemodynamic responses of cardiovascular systems in exercise-conditioned and aorta-constricted animals when subjected to methoxamine administration. Major alterations seem to lie in the ability to maintain cardiac output in the face of increasing peripheral resistance. Directionally opposite hemodynamic results occur in exercise-conditioned and aorta-constricted animals when subjected to identical cardiovascular stresses. Experiments that amalgamate these two conditions, i.e., exercise conditioning and aortic constriction, should provide mechanistic identification of the beneficial cardiovascular effects of repetitive exercise. G.R.

**A82-29563** **Adaptive changes in cats after long-term exposure to various temperatures.** H. Hensel and M. Banet (Marburg, Universität, Marburg, West Germany). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1008-1012. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Physiological and morphological adaptations developing upon prolonged exposure to the heat or the cold are investigated in cats exposed to 5 and 30 C for periods of over a year. Two groups of animals were first exposed to 5 or 30 C for 24 months, then the groups were switched and exposed to the alternative temperature for 36 months. Following the 36-month adaptation period, the cold-adapted cats showed increased fur growth and resting metabolic rates, a lowered threshold to the cold-induced metabolic response, and greater fur insulation at thermoneutrality than the warm-adapted cats. During acute exposure to -5 C, tissue insulation decreased in both groups, although fur insulation increased only in the warm-adapted cats. Norepinephrine given at thermally neutral ambient temperatures elicited nonshivering thermogenesis only in the cold-adapted animals. Despite the higher metabolic rate in the cold adapted animals, body weights did not differ between the groups, due to a corresponding increase in food consumption by the cold-adapted animals. A.L.W.

**A82-29564** **Effect of acid-base status on the kinetics of the ventilatory response to moderate exercise.** A. Oren, B. J. Whipp, and K. Wasserman (California, University, Medical Center, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1013-1017. 19 refs. Grants No. NIH-HL-11907; No. NIH-HL-07388.

An investigation was conducted to determine if an induced metabolic acidosis would speed the ventilatory kinetics during moderate muscular exercise and, conversely, whether metabolic alkalosis would slow the response. Five healthy male volunteers were studied. The obtained results demonstrate that metabolic acidosis, which is known to stimulate the carotid bodies, decreased the time constant of the ventilatory response to exercise during air breathing, whereas metabolic alkalosis appeared to slow the ventilatory response, although this did not attain statistical significance. G.R.

**A82-29565** **Body fluid and hematologic adjustments during resting cold acclimation in rhesus monkey.** I. R. Oddershede and R. S. Elizondo (Indiana University, Bloomington, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1024-1029. 20 refs. Grants No. NIH-AM-16703; No. NIH-AM-00061.

**A82-29566** **No effect of naloxone on hypoxia-induced ventilatory depression in adults.** S. Kagawa, M. J. Stafford, T. B. Waggener, and J. W. Severinghaus (California, University, San Francisco, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1030-1034. 26 refs.

**A82-29567** **Functional diagrams of flow and volume for the dog's lung.** D. S. Moffatt, A. C. Guyton, and T. H. Adair (Mississippi, University, Medical Center, Jackson, MS). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1035-1042. 12 refs. Grant No. NIH-HL-11678.

**A82-29568** **Theoretical analysis of optimal P50.** D. C. Willford, E. P. Hill, and W. Y. Moores (California, University, La Jolla; U.S. Veterans Administration Medical Center, San Diego, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1043-1048. 25 refs. Research supported by the U.S. Veterans Administration; Grants No. NIH-5-I-32-HL-07212-05; No. NIH-HL-17731; No. NIH-K04-HL-00418.

A simple expression is derived to describe the partial pressure at 50% hemoglobin saturation with oxygen (P50) that maximizes venous oxygen tension - P(O2) - for a given arterial P(O2) and oxygen consumption. That 'optimal P50' also maximizes arteriovenous saturation differences for given arterial and venous P(O2) values. The optimal P50 can be expressed as the square root of the product of arterial and venous P(O2) values. Alternatively, it can be expressed as a simple function of the arterial P(O2) and the arteriovenous saturation difference. Nomograms summarize the relationships between the variables, and published observations that suggest an observational basis for theoretical analysis are reviewed. It is concluded that for normoxia or moderate hypoxia a high P50 is advantageous, whereas for more severe hypoxia or increased metabolic demands, a low P50 is advantageous. (Author)

**A82-29569** **Adjustments in metabolic heat production by squirrel monkeys exposed to microwaves.** E. R. Adair (John B. Pierce Foundation Laboratory, New Haven, CT) and B. W. Adams (Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1049-1058. 31 refs. Grant No. AF-AFOSR-77-3420.

The basic fact that microwave exposure can lower metabolic heat production has been previously demonstrated for the mouse by Ho and Edwards (1977) and for the rat by Phillips et al. (1975). The general conclusion drawn from both studies was that the metabolic reduction produced by microwave exposure was dose dependent. The present study extends the investigation into the effects of microwave exposure on metabolic heat production to a primate, the squirrel monkey. When squirrel monkeys are restrained in cool environments, body temperature is regulated by an increase in metabolic heat production. The results of the current study demonstrate that either brief or prolonged whole-body exposure to a microwave field will cause a reduction of this elevated heat production by an amount directly related to the microwave energy absorbed. G.R.

**A82-29570** **Lipoprotein lipase hydrolyzes endogenous triacylglycerols in muscle of exercised rats.** L. B. Oscai, R. A. Caruso, and A. C. Wergeles (Illinois, University, Chicago, IL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1059-1063. 45 refs. Grants No. NIH-AM-17357; No. NIH-K04-AM-00216; No. NIH-HD-10087.

**A82-29571** **Comparative physiological responses to exercise stress.** A. B. Hastings, F. C. White, T. M. Sanders, and C. M. Bloor (California, University, La Jolla, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1077-1083. 26 refs. Grants No. NIH-HL-17682; No. NIH-HL-07104.

Experiments to determine the effect of exhaustive exercise on the acid-base balance, O2 consumption, and cardiac output in dogs and pigs are described, along with possible applications of the results for humans. Eleven dogs and 11 Yucatan miniswine were subjected to treadmill exercise with silastic catheters implanted in the aortic arch and right ventricle. Work output, cardiac output, heart rate, blood constituents, aortic pressure, blood gas tensions, hematocrit, and plasma lactic acid were monitored. The animals were run to exhaustion on the machine in peak and steady-state exercise modes. Dogs displayed a greater work capacity than the pigs but could not sustain maximal capacity as long. A similarity was observed between metabolic acidosis in the pigs and previous human results, an occurrence that corresponded with exhaustion. O2 correlations were also present, and the data suggested that pigs and humans can perform more work with less O2 than can dogs. It is recommended that future endurance testing of animals as an indicator of human performance be carried out with pigs. M.S.K.

**A82-29572** **Chemoreceptor involvement in cortisol responses to hypoxia in ventilated dogs.** H. Raff, S. P. Tzankoff, and R. S. Fitzgerald (Johns Hopkins University; National Institutes of Health, National Institute of Aging, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Apr. 1982, p. 1092-1096. 14 refs. Grants No. NIH-HL-10342; No. NIH-HL-07199.

Changes in cortisol secretion rate (CSR) in response to hypoxic hypoxia (HH) and to carbon monoxide hypoxia (COH) were assessed in mongrel dogs that had intact chemoreceptors (INT); surgically deafferented carotid bodies (CBD) or aortic bodies (ABD); or both carotid and aortic chemoreceptors denervated (SAD). All dogs were anesthetized, paralyzed, ventilated, and maintained normocapnic. In the INT and ABD groups, CSR responded 'maximally' to HH, whereas in CBD and SAD animals, the CSR was attenuated but not eliminated. COH, which does not stimulate the carotid body, caused a submaximal increase in CSR regardless of chemoreceptor status. It is concluded that (1) the carotid bodies are the principal chemoreceptor influence on CSR during HH and (2) there is a nonchemoreceptor-mediated increase in CSR during hypoxia. (Author)

**A82-29574** **NMR imaging in medicine.** I. L. Pykett. *Scientific American,* vol. 246, May 1982, p. 78-88.

The theoretical and experimental foundations of nuclear magnetic resonance (NMR) for medical diagnosis are explored. Atomic nuclei possess electric charge which generates a magnetic field, and nuclei with a net zero detectable spin have an associated dipole, while uneven numbered nucleon atoms exhibit spin and can be detected by NMR spectroscopy. The measurement of the bulk magnetic field of an object immersed in a magnetic field and then subjected to another magnetic field at right angles to the first yields a relationship between the Larmor frequency, the natural processional frequency of the bulk nuclei, and the field strength, which is unique for each atomic species. Tipping the bulk magnetization vector results in a rise of the energy levels of the nuclei, which releases an electromotive signal. Application to human internal imaging is enhanced by the fact that humans are 75% water, and therefore have many hydrogen atoms. Exact conversion of the signal to an image is outlined, and the characterization of healthy NMR responses for later detection of disease onset is described. M.S.K.

**A82-29671** * **A model of human decisionmaking in multiple process monitoring situations.** J. S. Greenstein (Virginia Polytechnic Institute and State University, Blacksburg, VA) and W. B. Rouse (Georgia Institute of Technology, Atlanta, GA). *IEEE Transactions on Systems, Man, and Cybernetics,* vol. SMC-12, Mar.-Apr. 1982, p. 182-193. 17 refs. Grant No. NsG-2110.

It is proposed that human decisionmaking performance in multiple process monitoring situations can be modeled in terms of the detection of process related events and the allocation of attention among processes once events are felt to have occurred. An elementary pattern recognition technique, discriminant analysis, is used to generate estimates of event occurrence probability. A queueing theory framework is then utilized to incorporate these probabilities as well as other task characteristics into the solution of the attention allocation problem. The performance of the model is compared with that of subjects in two experiments. (Author)

**A82-29672** **Scheduling of parallel computation for a computer-controlled mechanical manipulator.** J. Y. S. Luh and C. S. Lin (Purdue University, West Lafayette, IN). *IEEE Transactions on Systems, Man, and Cybernetics,* vol. SMC-12, Mar.-Apr. 1982, p. 214-234. 18 refs. NSF Grant No. APR-77-14533.

The physical compactness of the microcomputer has made it feasible to mount the controller and the mechanical manipulator together as a single unit. By using a computer with multiple central processing units (CPU's), parallel computations may be executed to achieve a minimum computing time so that a real-time control is possible. The parallel processing system utilizes one CPU for each link of the manipulator. Because of the dynamic coupling between adjacent links, precedence relations appear among the subtasks to be executed in CPU's. Under the series-parallel precedence constraints a method of 'variable' branch-and-bound has been developed which determines an optimum ordered schedule for each of the CPU's. It consists of, alternatively, forward and backward search procedures with an aid of pushdown-stacks. In each forward search procedure, it seeks the currently feasible schedule with shorter computing time which updates the upper bound of the optimum schedule, while in each backward search procedure it discards those schedule-branches that will not provide improvements. A Fortran program has been written for a manipulator based on the Newton-Euler formulation of dynamic equations and is applied to the Stanford manipulator as an illustration. (Author)

**A82-29697** † **Regional redistribution of blood flow in the cat under conditions of high ambient temperature (Regionarnoe pereraspredelenie krovotoka u koshek v usloviiakh vysokoi vneshnei temperatury).** G. F. Sultanov, D. P. Dvoretskii, R. L. Nadyrshin, and B. I. Tkachenko (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Mar. 1982, p. 385-390. 10 refs. In Russian.

**A82-29698** † **Mechanism for the change in pulmonary blood volume upon the stimulation of the vagosympathetic trunk (Mekhanizm izmeneniia ob'ema krovi v dole legkogo pri razdrazhenii vagosimpaticheskogo stvola).** L. P. Kuz'minykh and B. I. Mazhbich (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Mar. 1982, p. 398-404. 20 refs. In Russian.

**A82-29699** † **Comparative characteristics of respiratory and circulatory changes upon acute hyperthermia in cats (Sravnitel'naia kharakteristika izmenenii dykhaniia i krovoobrashcheniia pri ostroi gipertermii u koshek).** V. A. Tashliev and D. P. Dvoretskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Mar. 1982, p. 405-410. 12 refs. In Russian.

**A82-29806** † **Disclosure of the complex structure of the absorption spectrum of bacteriorhodopsin (Obnaruzhenie slozhnoi struktury spektra pogloshcheniia bakteriorodopsina).** N. V. Karneeva, S. P. Balashov, and F. F. Litvin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 3, 1982, p. 726-729. 12 refs. In Russian.

**A82-29807** † **The relationship between circadian and circannian rhythms of some parameters of the heart contractile function and vascular tension (O vzaimootnoshenii tsirkadiannykh i tsirkannykh ritmov nekotorykh pokazatelei sokratitel'noi funktsii serdtsa i sosudistogo tonusa).** V. A. Frolov, S. M. Chibisov, T. A. Kazanskaia, L. V. Efimova, and E. V. Tsivareva (Universitet Druzhby Narodov, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 3, 1982, p. 753-756. 11 refs. In Russian.

**A82-29816** † **Effects of reversible manganese extraction on the light reactions of photosystem II preparations (Deistvie obratimoi ekstraktsii margantsa na svetovye reaktsii preparatov fotosi-**

stemy II). V. V. Klimov, S. I. Allakhverdiev (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, USSR), V. A. Shuvalov, and A. A. Krasnovskii (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 4, 1982, p. 1001-1005. 15 refs. In Russian.

The role of manganese ions in the photoreduction of Q, the primary electron acceptor in the electron transport chain of photosystem II, is investigated. Preparations of pea chloroplast fragments were treated to remove up to 95% of the manganese contained within them, and photosystem II activity was evaluated according to the magnitude of reversible changes in chlorophyll fluorescence connected with the photoreduction of Q. The extraction of manganese is observed to lead to a suppression of photoinduced fluorescence changes which may be restored by the addition of micromolar amounts of Mn (+2) ions or 10 to the -8th molar amounts of MnCl2 in combination with various divalent metal ions. The amount of MnCl12 required corresponds to one atom of Mn per 110 chlorophyll molecules, or two atoms per one reaction center. Results indicate reactivation to be connected with the formation of stable Mn complexes in photosystem II active structures, which are capable of undergoing multiple reduction. A.L.W.

**A82-29817 †** **The damaging effects of light on the retina - The role of singlet oxygen and lipid peroxides (Povrezhdaiushchee deistvie sveta na setchatku - Uchastie singletnogo kisloroda i perekisei lipidov).** I. Ia. Kuliev, A. A. Shvedova, V. E. Kagan, A. A. Krasnovskii, and Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 4, 1982, p. 1005-1009. 10 refs. In Russian.

The effects of singlet oxygen generated by exogenous or endogenous retinal or an alternative exogenous source on retinal electrical activity and on the generation of peroxidized lipids in the photoreceptor membrane are investigated in a study of a possible mechanism for photoinduced retinal damage. Electroretinograms of isolated frog retinas in the presence of endogenous retinal or the photosensitizers methylene blue or trans-retinal show a decline in electrical activity following illumination. The addition of a quencher of singlet oxygen or inhibitors of free-radical oxidation is found to prevent the photosensitized damage to the retina whatever the photosensitizer. Results thus support a mechanism of photoinduced retinal damage involving the photoinduced conversion of rhodopsin to retinal and singlet oxygen, which then acts in the peroxidation of membrane lipids causing retinal damage. A.L.W.

**A82-29959** **Etiological aspects of in-flight discomforts (Aspects étiologiques des malaises en vol).** G. Leguay (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 267-277. 8 refs. In French.

The statistical distributions and possible etiologies of non-incapacitating in-flight discomfort experienced by flight personnel are discussed. The unreliability of frequency statistics for in-flight discomfort is noted, and distributions of these events with respect to aircrew age, flight experience, and flight specialty are examined. The symptomology of in-flight discomforts, which take the forms of alterations in higher functions, psychological manifestations, behavior problems, asthenia, and sensory, cardiovascular, respiratory, digestive and nociceptive manifestations, is briefly reviewed, and the types of discomforts to which pilots are susceptible are indicated. Attention is then given to aeronautical factors, organic human factors, functional human factors including the tri-syndrome of vagotonia, spasmophilia and hypoglycemia, and psychological factors as agents important in the development of symptoms. The importance of multiple causative factors is emphasized, and the underlying physiological and psychological maladaptations giving rise to the observed syndromes are discussed. A.L.W.

**A82-29960** **Diabetes mellitus and the examination of flight personnel (Diabète sucré et expertise du personnel navigant).** A. Didier (Hôpital d'Instruction des Armées Val-de-Grâce, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 282-285. 18 refs. In French.

Questions of the initial selection and subsequent flight qualifications of flight personnel with diabetes mellitus are addressed. Hyperglycemic effects of the flight environment are examined. Attention is then given to the methods used by the French Air Force for the detection of diabetes in flight personnel, the prevalence of diabetes thus detected, which is significantly less than in the general population, and to the general characteristics of diabetic pilots, and techniques to be used to improve the detection of diabetic angiopathy are suggested. The influence of diabetes mellitus on the flight aptitude of air force personnel is then discussed, and the policy adopted in 1974 is reviewed, in which diabetes upon initial flight examination is disqualifying, however that developing during one's career is only disqualifying if it involves dangerous or inconvenient treatments or complications affecting aptitude. A.L.W.

**A82-29961** **Diabetes and flight personnel - Ophthalmologic aspects (Diabète et personnel navigant - Aspects ophtalmologiques).** J. P. Chevaleraud (Service de Santé des Armées, Paris, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 286-289. 5 refs. In French.

The role of the ophthalmologist in the detection and surveillance of flight personnel with diabetes is discussed. Diabetes is sometimes detected during regular ophthalmologic examinations or on the occasion of diabetic complications, and is evidenced by retinopathy involving microaneurisms, arterial and venous modifications, vascular proliferation originating at a vein, and signs of retinal injury including exudates, edema and hemorrhages. Paraclinical evaluation and surveillance methods for diabetics most frequently include fluorescein angiography, electrophysiological techniques, and tests of color perception, the central visual field, and glare sensitivity. By these means, the aeronautical ophthalmologist plays an important role in the determination of the flight qualifications of a diabetic aircrew member. A.L.W.

**A82-29962** **Sarcoidosis and aeronautical aptitude (Sarcoïdose et aptitude aéronautique).** A. Seigneuric, G. Leguay (Service de Santé des Armées, Paris, France), and J. de Bourayne (Hôpitaux des Armées, Paris, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 290, 291. In French.

Problems posed by sarcoidosis for the aeronautical aptitudes of flight personnel are discussed. Localizations of the granulomatous lesions which are well tolerated and pose no particular problems for prognosis or aptitude, such as cutaneous, hepatosplenic, peripheral ganglionic, osteoarticular or parotidean sites, are distinguished from those localizations embodying major risks to aptitude or life: pulmonary, nervous, ocular and cardiac sites and hypercalcemia. The questions of corticoid treatment and the consequent loss of flight aptitude are considered, and three stages at which a decision as to flight aptitude may be taken are distinguished. Finally, attention is given to possible techniques which may be used for the detection of latent lesions, which include electroencephalography and cerebral scintigraphy in the case of cerebral localizations, and continuous ambulatory electrocardiography, echocardiography and thallium scintigraphy in the case of cardiac localizations. A.L.W.

**A82-29963** **Current clinical approaches to mediastino-pulmonary sarcoidosis (Approches actuelles de la sarcoïdose mediastino pulmonaire en clinique).** J. Kermarec (Hôpital d'Instruction des Armées Percy, Clamart, Hauts-de-Seine, France), G. Haguenauer, D. Dormont, P. Allard, J. Heyraud, and P. Laffargue. *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 292-294. In French.

The clinical management of mediastino-pulmonary sarcoidosis is discussed in view of the frequency of this localization of the disease. Situations requiring histological confirmation of the diagnosis are pointed out, and the prognosis of the disease with and without corticosteroid therapy is considered. Indications for treatment are then discussed, with particular attention given to immunological depression, pulmonary lymphocytic activity, angiotensin conversion enzyme levels and results of gallium-67 scintigraphy. It is noted that such techniques allow the close monitoring of the progress of the disease as well as rational decisions with respect to therapy and patient capabilities. A.L.W.

**A82-29994** **Spontaneous pneumothorax in a military environment (Le pneumothorax spontané en milieu militaire).** G. Haguenauer, J. Karmarec, P. Allard, B. Epardeau, X. Foullon, and J. D. Heyraud (Hôpital d'Instruction des Armées Percy, Clamart, Hauts-de-Seine, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 294-297. In French.

The distribution, diagnosis, etiology and treatment of cases of spontaneous pneumothorax observed at a military hospital are discussed. Spontaneous pneumothorax is found to be more frequent in males aged 20-30, even when accounting for the age and sex composition of military personnel, and more often encountered during the winter. Most of the cases are accounted for by benign idiopathic pneumothorax, in patients of anthropometric indices characteristic of Marfan's syndrome, and did not occur subsequent to exertion. Radiology showed an equal distribution between the left and right lungs, a plurality of total pneumothorax over apical and parietal, and various radiological anomalies. Surgical intervention was necessary in 56 of the 123 cases seen, due to a recurrence of the condition following conservative treatment. Post-operative respiratory functions were found to be normal following a period of four months, and a recurrence was found in only one patient. A.L.W.

**A82-29995** **Idiopathic spontaneous pneumothorax and the examination of flight personnel (Pneumothorax spontané idiopathique et expertise du personnel navigant).** J. Droniou (Hôpital d'Instruction des Armées Val-de-Grâce, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 297-300. In French.

The etiology of idiopathic spontaneous pneumothorax is examined and discussed in relation to its occurrence in flight personnel. The pathogenesis of the apical pulmonary bubbles giving rise to the condition is considered, and mechanical and ischemic factors influencing the generation of the lesions are pointed out. Attention is then given to the frequency of idiopathic spontaneous pneumothorax in the aviation environment, the aeronautical factors influencing its onset, its incidence under flight conditions, which is unexpectedly low, and the question of recurrences, which occur in about 20 percent of the cases. The management of pneumothorax cases in flight personnel is then discussed, and the advantages of the surgical creation of a solid symphysis in preventing recurrences are pointed out. A.L.W.

**A82-29996** **Sickle cell anemia and aviation (Drépanocytose et aviation).** G. Leguay and A. Vauzelle (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 304-308. In French.

Problems associated with the onset of sickling of the red blood corpuscles leading to thrombotic accidents under flight conditions in persons with sickle cell anemia are discussed. Clinical aspects of in-flight sickle-cell accidents are reviewed, with attention given to their frequency, age and sex distributions, flight conditions and types of hemoglobinopathies, pathology and outcome. The role of hypoxia in the induction of sickling and clinical manifestations observed in flight is examined based on observations of actual cases and pressure chamber simulations, in which a close relation between altitude and the risk of an accident has not been established, and flight factors other than hypoxia implicated in sickling are indicated. Recommendations concerning the flight qualification of homozygotic and heterozygotic carriers of the disease and the in-flight treatment and prevention of sickle-cell accidents are then presented. A.L.W.

**A82-29997** **Sequelae of spinal column traumas in aeronautical medicine (Les séquelles des traumatismes de la colonne vertébrale en médecine aéronautique).** R. P. Delahaye, R. Auffret, P. J. Metges, Mr. Chauvet, and A. Leger (Hôpital d'Instruction des Armées Dominique Larrey, Versailles; Hôpital d'Instruction des Armées Begin, Saint-Mandé, Val-de-Marne; Centre d'Essais en Vol, Brétigny-sur-Ogre, Essonne; Service de Santé des Armées, Paris, France). *(Journées Cliniques de Médecine Aéronautique, Versailles, France, Dec. 5, 6, 1980.) Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare,* vol. 20, 3rd Quarter, 1981, p. 309-312. In French.

The etiology of and clinical manifestations of sequelae to spinal traumas suffered by persons engaging in aeronautical activities are examined. The majority of back traumas is noted to occur during emergency operations, particularly crash or forced landings, parachuting, ejection or rapid vibratory phenomena in fighter aircraft, with each situation exhibiting characteristic sets of localizations. Persons with these various types of back injuries fall into four categories: (1) those for which the spinal fracture is not detected, who exhibit localized back pain 3-6 months after the accident; (2) those with recognized and treated fractures presenting tardive pain upon resumption of flight activities; (3) those experiencing pain in the absence of clinical or radiological findings; and (4) those operated on for lumbar disk hernias or fractures. A.L.W.

**A82-30026** † **In the struggle for the health of sailors (V bor'be za zdorov'e moriakov).** B. G. Makarenko. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 7, 8. In Russian.

Activities undertaken by the medical personnel of the Pacific fleet ensuring the maintenance of sailor health are discussed. Attention is given to the duties of the ship's doctor, and to the support provided by the naval medical service in the forms of equipment, training and continuing education. The role of the medical advisory group, consisting of medical specialists from hospitals, the naval medical commission and hygiene and epidemiologic establishments, is also noted. A.L.W.

**A82-30027** † **Effects of ascorbic acid on the elevation of human cold tolerance (Vliianie askorbinovoi kisloty na povyshenie ustoichivosti cheloveka k kholodu).** V. P. Kovalenko and V. V. Pastukhov. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 42, 43. 8 refs. In Russian.

**A82-30028** † **Use of an active orthostatic test in aeromedical examinations (Ispol'zovanie aktivnoi ortostaticheskoi proby v praktike vrachebno-letnoi ekspertizy).** V. D. Vlasov, I. G. Dlusskaia, and A. S. Nekhaev. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 44-46. 13 refs. In Russian.

The suitability of an active orthostatic test as a method for the determination of individual cardiovascular functional characteristics is studied. Orthostatic tolerances were determined in the morning in 12 healthy men by an active orthostatic test, in which arterial pressure was determined by the ausculatory method in the lying position and following the assumption of a standing position, and by a passive test on a tilt table with measurements by tachooscillography of the brachial artery, sphigmogrammetry of the radial artery and electrocardiography. Whereas responses to the passive orthostatic test clustered around a value of 6.9 for the orthostatic index, a greater variability in responses to the active orthostatic test was found. Subsequent evaluation of physiological parameters during a passive orthostatic test conducted during the optimal working period of the day confirmed preliminary indications of a lowered tolerance in subjects exhibiting high orthostatic indexes on the active orthostatic test. Results demonstrate the diagnostic value of the simple active orthostatic test for applications in aeromedical examinations. A.L.W.

**A82-30029** † **The organization of blood transfusions and blood substitutes on board ships at sea (Organizatsiia perelivaniia krovi i krovezamenitelei na korabliakh v more).** V. D. Shevchenko and G. N. Zavgorodnii. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 46, 47. In Russian.

**A82-30030** † **The value of spiroergography in the diagnosis of the initial stage of cardiac insufficiency (Znachenie spiroergografii v diagnostike nachal'noi stadii serdechnoi nedostatochnosti).** V. I. Koledenok and K. I. Korytnikov. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 56-58. In Russian.

Spiroergography is evaluated as a possible noninvasive means for the detection of the initial stage of cardiac insufficiency during exercise in patients with ischemic heart disease. Measurements of oxygen consumption were compared with electrocardiography obtained during graded submaximal bicycle ergometer exercise in patients with ischemic heart disease and healthy controls. Results of spiroergography allowed the division of the patients into two groups: those exhibiting no signs of cardiac insufficiency during exercise and those in its initial stages. The first group is observed to exhibit a greater exercise tolerance, amount of work performed, exercise oxygen consumption, level of aerobic reserves, oxygen consumption per kg body weight, and oxygen consumption per heartbeat and less oxygen consumption per unit work performed than the second group, although values of these parameters were significantly exceeded by the controls. Results thus demonstrate the capacity of spiroergometry to distinguish between cardiac compensation and the initial stages of cardiac insufficiency in patients with ischemic heart disease. A.L.W.

**A82-30031** † **Perforated gastric and duodenal ulcers in servicemen (Probodnye iazvy zheludka i dvenadtsatiperstnoi kishki u voennosluzhashchikh).** G. N. Tsybuliak and V. N. Satsukevich. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 62-64. In Russian.

**A82-30032** † **Study of the simultaneous effects of hormones and radioprotectors in the exposure of animals to ionizing radiation (Issledovanie sovmestnogo deistviia gormonov i radioprotektorov pri ioniziruiushchem obluchenii zhivotnykh).** D. Benke, K. Bodo-Sekeikhidine, and A. Shanta. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 65-68. 14 refs. In Russian.

The effects of anabolic and related hormones, which act to suppress the inhibition of protein synthesis induced by ionizing radiation, in combination with radioprotective compounds on the survival of animals exposed to ionizing radiation are investigated. Survival rates were evaluated in mice exposed to 630 and 800 R (minimum lethal and absolute lethal doses) of X rays, or a dose of 750 R of gamma rays (the LD50) with preliminary or concurrent administration of the radioprotectors AET (S2-beta-aminoethylisothiuroniumbromide hydrobromide) and ixeprine (sodium bis-alpha-propynylglycyl disulfide) and the anabolic hormones nerobolyl (norandrostenolone phenylpropionate) and petabolyl (norandrostenolone decanoate) and the hormone retandrol (testosterone phenylpropionate). Whereas the single injection of an anabolic combined with a radioprotector is not seen to increase survival rates, their combined use is effective when the radioprotector is administered before radiation and anabolics are continued following irradiation. The best results are obtained with the hormone nerobolyl. A.L.W.

**A82-30033** † **The survival of dogs irradiated with lethal doses of gamma radiation under conditions of chemical radioprotection and subsequent therapy (Vyzhivaemost' letal'no gamma-obluchennykh sobak v usloviiakh khimicheskoi radiozashchity i posleduiushchei terapii).** P. Kuna, M. Dostal, and P. Petyrek. *Voenno-Meditsinskii Zhurnal,* Feb. 1982, p. 68, 69. 6 refs. In Russian.

The effectiveness of the intramuscular introduction of radioprotective substances and therapeutic substances in the increase of survival under exposure to ionizing radiation is investigated in dogs. Animals were exposed to a dose of 300 rad 15-20 min after the intramuscular injection of cystamine or a combination of cystamine with mexamine, and treated with vitamins, antibiotics and ferripolyglukine for 28 days following exposure. In experiments conducted in the summer, the use of radioprotective substances with therapy is not found to increase survival significantly with respect to the use of therapy alone. Therapy without radioprotectors is, however, ineffective in increasing survival under winter conditions, at temperatures of -6 C. In these conditions, only the combination of radioprotectors with therapy increased the number of surviving animals. A.L.W.

**A82-30296** * **The effect of abnormal cell proportion on specimen classifier performance.** K. R. Castleman and B. S. White (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *Cytometry,* vol. 2, no. 4, 1981, p. 155-158. NIH-supported research; Contract No. NAS7-100.

An analysis is presented of the results obtained from a cell classifier which is confronted with an abnormal/normal cell ratio which is different from the ratio assumed in the calibration of the classifier. False negative and false positive error rates are determined in advance for classifier operation, along with the necessary sample size in order to validate the predicted distributions. Changes are demonstrated to happen only regarding the false negative rate, where reductions in the abnormal cell rate below the expected rates would cause totally unreliable data. Substantial overproduction of abnormal cells would be quickly noticeable, while production rates beyond, but close to, the expected rates would only require more extensive sampling. Classifier systems for 10% proportions of abnormal cells are concluded to be possible, but difficulties are present with much lower rates. M.S.K.

**A82-30298** † **For a prolonged stay in space (Dlia dolgo prebyvaniia v kosmose).** I. Iudin (Federatsiia Kosmonavtiki SSSR, USSR). *Nauka i Tekhnika,* Jan. 1982, p. 6, 7. In Russian.

The techniques tested on Salyut-6 to counter the adverse effects of prolonged weightlessness on physiological functions are described. These techniques include the use of specially designed space suits, the use of treadmills and bicycle ergometers, and electrical stimulation of the muscles. B.J.

**A82-30301** † **Evidence for a biological clock.** V. Kiuchariants. *Soviet Life,* Jan. 1982, p. 58.

Mechanisms which influence the biologic rhythms of human cells and the possibility of controlling the alterations are discussed. Cells are known to delay splitting while repairs to DNA strands are occurring, and illness can be felt on a whole-person level when disruptions of internal rhythms have been induced by noise, changed daily schedules, and with the ingestion of narcotics. Increased cell fission rates increase the rate of onset of cell death. Some indications are present that the regulatory mechanism resides in the hypothalamus, although the resistance of the body to disease is asserted to reside in the integrity of cellular membranes. The membranes limit the distance that DNA strands may drift apart when damaged, thus increasing the opportunities for self-repair. M.S.K.

**A82-30302** † **Thermal shock and gene operation (Teplovoi shok i rabota genov).** M. B. Evgen'ev. *Khimiia i Zhizn',* June 1981, p. 14-19. In Russian.

Molecular processes occurring in the cell which serve to protect an organism from overheating are discussed. The discovery of puffs in the salivary gland giant chromosomes of drosophila which become apparent upon animal exposure to high temperatures is considered, and the isolation of the seven so-called thermal shock proteins corresponding to the nine sites of RNA synthesis signalled by the giant chromosome puffs is outlined. The question of the regulation of the genes expressing the thermal shock proteins is considered, and evidence for a gene responsible for the turning on and normal operation of the thermal shock system, possibly by some mechanism involving the mitochondria, is presented. Questions of the mechanism of action of the thermal shock proteins, which have been observed to bind to sites of former puffs on the chromosome and of the evolution and existence of such thermal protection mechanisms in different species are then considered. A.L.W.

**A82-30303** † **Under the hot sun (Pod solntsem goriachim).** F. F. Sultanov (Akademiia Nauk Turkmenskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Aridnoi Zony, Turkmen SSR). *Khimiia i Zhizn',* June 1981, p. 9-13. In Russian.

A discussion is presented on experience gained at the Institute of Physiology and Experimental Pathology of the Academy of Sciences of the Turkmenian SSR on the effects of heat and techniques of adaptation to conditions of desert heat. Particular consideration is given to a bicycle-ergometer simulator for adaptation to desert heat. B.J.

**A82-30786** **The role of protein phosphorylation in neutral and hormonal control of cellular activity.** P. Cohen (Dundee, University, Dundee, Scotland). *Nature,* vol. 296, Apr. 15, 1982, p. 613-620. 160 refs. Research supported by the Medical Research Council, British Diabetic Association, British Heart Foundation, and Cancer Research Campaign.

Current knowledge of the control of glycogen metabolism is reviewed, and the increasing body of evidence is presented that implicates many of the proteins involved in the control of glycogen metabolism in the regulation of other cellular activities. Neural control via calcium ions, hormonal control of glycogen metabolism by multi-site phosphorylation, and protein phosphatases involved in glycogen metabolism in skeletal muscle are discussed. The role of cyclic AMP-dependent protein kinase and of calmodulin in regulating enzyme activity are detailed. Various protein phosphatases involved in different cell functions are discussed. C.D.

**A82-30870** **Perception of suprathreshold stimuli during saccadic eye movement.** L. A. Riggs, R. K. Moore, A. G. Ellicott (Brown University, Providence, RI), and F. C. Volkmann (Smith College, Northampton, MA). *Vision Research,* vol. 22, no. 4, 1982, p. 423-428. 44 refs. Grant No. NIH-R01-EY-03180.

**A82-30871** **Evidence for transient luminance and quasi-sustained color mechanisms.** S. H. Schwartz and M. S. Loop (Alabama, University, Birmingham, AL). *Vision Research,* vol. 22, no. 4, 1982, p. 445-447. 14 refs. Grants No. NIH-R01-EY-03303; No. NIH-T32-EY-07703-3; No. NIH-P30-EY-03039.

Experimental results from an examination of perceptual temporal characteristics of luminance and color detection are reported. Light from a 12 V bulb was focused on the subject's pupil with the luminance being varied and measured by a photometer. The subjects pressed a telegraph key when any stimulus was perceived. Filters controlled the level of luminance and the color, and white noise was continuously supplied through earphones to mask shutter noise. Flashes at 620 and 460 nm elicited responses corresponding to color perception and generated histograms which were different from a pure luminance change. It was concluded that luminance threshold is governed by a transient visual mechanism while color perception is governed by a slower, quasi-sustained visual mechanism. Increasing the background intensity tended to create a situation where either color or luminance were equal detection stimuli in terms of quickness of response. M.S.K.

**A82-30872** **Contour curvature analysis - Hyperacuities in the discrimination of detailed shape.** R. J. Watt and D. P. Andrews (Keele, University, Keele, Staffs., England). *Vision Research,* vol. 22, no. 4, 1982, p. 449-460. 18 refs.

Curvature discrimination thresholds were measured for a wide range of stimulus curvatures and sizes. Results are compared with an ideal processor of curvature to provide relative efficiencies. The results lead to three major findings. (1) Curved lines may be processed with the same precision as straight lines for decisions of shape, demonstrating a new class of hyperacuity. (2) High relative efficiencies are obtained for all curved lines with an orientation range of less than 40 deg. (3) This performance is not however consistent with common processing for straight and curved lines. The results are discussed, and two or possibly three separate processes are suggested as the basis for detailed shape perception. (Author)

**A82-30873** **The effect of convergence on the vestibulo-ocular reflex and implications for perceived movement.** R. B. Post and H. W. Leibowitz (Pennsylvania State University, University Park, PA). *Vision Research,* vol. 22, no. 4, 1982, p. 461-465. 17 refs. Grants No. NIH-MH-08061; No. NIH-EY-03276.

The apparent motion of a fixated stimulus during head translation in the dark was found to depend on the magnitude of the vestibulo-ocular reflex (VOR). Absolute convergence level determines VOR magnitude and thereby influences apparent motion during head movement by determining the magnitude and direction of the pursuit effort required to maintain gaze stability. The results are discussed in terms of the biological utility of the coupling between convergence and the VOR in maintaining image stability, and the role of the pursuit eye movement system in illusory movement. (Author)

**A82-30874** **Contrast sensitivity at high velocities.** D. C. Burr (CNR, Istituto di Neurofisiologia, Pisa, Italy) and J. Ross. *Vision Research,* vol. 22, no. 4, 1982, p. 479-484. 33 refs.

Measurements were made of the contrast required to see the direction of motion of drifting gratings and of moving bars. The spatial frequency at which least contrast is required to see sinusoidal gratings decreases as their velocity increases, but peak sensitivity is identical at all velocities up to 800 deg/sec. Similarly, the wider a single bar, the higher the velocity at which it is best visible. A bar 80 deg wide is best seen when moving at 300-600 deg/sec, and can be seen, and its direction of motion identified, even when moving at 10,000 deg/sec. These results show that motion does not diminish the visual passband, but instead slides the spatial frequency window along the spatial frequency scale, maintaining peak sensitivity at a temporal frequency of about 10 Hz (at photopic luminances). (Author)

**A82-30875** **A contribution to the history of Russian and Soviet aviation psychology: Documents and materials (K istorii otechestvennoi aviatsionnoi psikhologii: Dokumenty i materialy).** Edited by K. K. Platonov. Moscow, Izdatel'stvo Nauka, 1981. 320 p. In Russian.

This work is an annotated collection of archival documents and memoirs relating to the history of Russian and Soviet aviation psychology. The material covered ranges from the first scientific balloon flight in Russia in 1804 to the development of Soviet aviation psychology from 1917 to 1940. B.J.

**A82-30952** # **Biological effects of high-frequency radiation - The concept of the specific absorption rate /SAR/ and its effect on safety regulations (Biologische Effekte der Hochfrequenzstrahlung - Das Konzept der Spezifischen Absorptionsrate SAR und seine Auswirkungen auf Schutzvorschriften).** K. W. Hofmann (Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Hochfrequenzphysik, Wachtberg-Werthhoven, West Germany). *(International Union of Radio Science and Nachrichtentechnische Gesellschaft, Gemeinsame Tagung, Kleinheubach, West Germany, Oct. 5-9, 1981.) Kleinheubacher Berichte,* vol. 25, 1982, p. 3-17. 63 refs. In German.

The development of protection guidelines based on the biological effects of electromagnetic radiation in the radio frequency range is reviewed, and the concept of equating exposures in terms of a specific absorption rate (SAR) is presented. To define SAR in respect to orientation in the field over a relatively wide frequency range, models representing the absorbing body are used in addition to various techniques in theoretical dosimetry. The dosimetric results are presented in terms of the SAR to provide a basis for new developments in radio frequency radiation protection guidelines in the USA and the Federal Republic of Germany. D.L.G.

**A82-31151** † **Circadian rhythm dynamics under conditions of an altered gaseous medium and hypokinesia (Dinamika tsirkadnykh ritmov v usloviiakh izmenennoi gazovoi sredy i gipokinezii).** N. A. Agadzhanian and V. N. Cherniakova. *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 179-191. 68 refs. In Russian.

Characteristics of the daily oscillations in human physiological functions during restricted motor activity are investigated along with the possibility of correcting circadian rhythm impairments by the use of hypoxic breathing gas compositions, graded exercise and combinations thereof. Measurements of heart rate, body temperature, saliva sodium content, diuresis and urinary sodium and potassium excretion were made in 20 healthy subjects during 49 days of antiorthostatic hypokinesia and 30 days of bed rest in a pressure chamber. Prolonged hypokinesia is found to provoke various types of disturbances in human circadian rhythms, most notably a desynchronization of the rhythms studied and decreases in their amplitude. Moderate hypoxia at daily intervals stabilizes cardiac activity and body temperature rhythms, however marked effects are found when hypoxia is combined with graded exercise. A.L.W.

**A82-31152** † **Effects of geomagnetic field disturbances on the diurnal rhythm of physiological functions (Vliianie vozmushchenii geomagnitnogo polia na sutochnuiu ritmiku fiziologicheskikh funktsii).** G. V. Ryzhikov, V. A. Kuz'menko, and A. B. Buluev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 192-198. 20 refs. In Russian.

Differences in the diurnal physiological rhythms of healthy humans during times of weak and strong geomagnetic field disturbances are studied in light of observations of changes in physiological rhythms accompanying degradations in physiological condition and increased morbidity during geomagnetic disturbances. Body temperature, arterial pressure, heart rate and respiratory rate were measured six times daily in 30 healthy subjects at rest, and analyzed with respect to values of the mean K index for the corresponding days. Decreases in the range of diurnal adjustments of body temperature and heart rate and an advance of the transition from the positive to the negative phase of the diurnal rhythms are observed during periods of enhanced geomagnetic disturbances as indicated by K indexes between 3.7 and 5.3. Systolic pressures on the other hand exhibit the opposite tendencies on disturbed days. These unlike changes in the rhythms of different parameters thus lead to an increase in the mismatch of adaptive changes. A.L.W.

**A82-31153 †** **The relation between cardiac and respiratory rhythms as a function of the state of the geomagnetic field (Sootnoshenie mezhdu ritmami serdtsebieniia i dykhaniia v zavisimosti ot sostoianii geomagnitnogo poliia).** V. A. Kuz'menko, V. A. Gumeniuk, O. S. Raevskaia, and I. M. Syrkina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 199-202. 11 refs. In Russian.

The characteristics of cardiac and respiratory rhythms and their interrelationship in the same individual are compared for periods of high and low geomagnetic disturbedness. EKGs and pneumograms were measured two to three times a day in four healthy subjects over the course of 20 to 26 days, and compared with the level of geomagnetic disturbances as indicated by the three-hour K index for the corresponding days. Functional reorganizations are observed during days of elevated geomagnetic disturbances, which are associated with increases in respiratory rate, a suppression of respiratory arrhythmias and, most often, a suppression of cardio-respiratory synchronism. A.L.W.

**A82-31154 †** **The ventilation-perfusion relation in residents of the Arctic coast of the north-east USSR (Ventiliatsionno-perfuzionnye sootnosheniia v legkikh u zhitelei Arkticheskogo poberezh'ia Severo-Vostoka SSSR).** A. P. Milovanov, M. T. Lutsenko, B. V. Noreiko, and G. I. Miroshnichenko (Akademiia Meditsinskikh Nauk SSSR, Moscow; Blagoveshchenskii Meditsinskii Institut, Blagoveshchensk, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 203-211. 10 refs. In Russian.

**A82-31155 †** **Evaluation of human operator reliability according to physiological data (Otsenka nadezhnosti cheloveka-operatora po dannym fiziologicheskikh issledovanii).** V. V. Gorbunov, V. V. Dosychev, and N. V. Makarenko. *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 217-222. 20 refs. In Russian.

Experiments were conducted to develop physiological criteria for human operator reliability as characterized by the probability of the correct processing of increasing amounts of visual information. Measurements of electroencephalographic beta, alpha, theta and delta waves, electromyograms of the left hand, heart rates and respiratory rates were obtained in subjects performing a trinary selection task when presented with visual signals at rates of from 30 to 100/min, and used to compute a degree of difficulty expressing the physiological cost of performing the task at various rates. The degree of difficulty computed according to the values of biological, emotional and purposeful activity indicators is found to exhibit a close linear relation with operator processing capacity at all information rates. Limiting value of the degree of difficulty for the efficient processing of quantities of visual information are obtained, and it is concluded that this factor may be used for the evaluation of operator reliability. A.L.W.

**A82-31156 †** **Method for improving the reliability of the recognition and classification of worker physiological condition in problems of work physiology (Metod povysheniia nadezhnosti raspoznavaniia i klassifikatsiia funktsional'nykh sostoianii organizma rabotnika v zadachakh fiziologii truda).** I. A. Merkur'ev and E. G. Tyshlek (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 223-227. 9 refs. In Russian.

**A82-31157 †** **Effects of novodrine and physical exercise on hemodynamics and coronary blood supply in the healthy human (Vliianie novodrina i fizicheskoi nagruzki na gemodinamiku i krovosnabzhenie serdtsa zdorovogo cheloveka).** V. V. Chestukhin, V. E. Katkov, R. I. Lapteva, N. I. Kauricheva, A. A. Petrov, I. Iu. Mart'ianova, O. Kh. Zybin, and V. N. Nesvetov (Ministerstvo Zdravookhraneniia SSSR, Institut Transplantologii i Iskusstvennykh Organov, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 231-246. 22 refs. In Russian.

The hemodynamic and metabolic responses of the normal heart to physical exercise and the injection of the catecholamine novodrine are determined to serve as a standard for the evaluation of cardiac patients. Catheterization of the left ventricle and coronary sinus were performed in five healthy male volunteers to allow blood sampling. Ergometer exercise and the administration of novodrine are found to produce equal changes in heart rate, cardiac cycle phase duration and contractility, although novodrine reduced cardiac preload while leaving afterload unchanged and exercise had the opposite effect. The product of heart rate with arterial pressure, an indirect indicator of myocardial oxygen demand, increased significantly with novodrine and more markedly after exercise; these changes were reflected in direct indicators of coronary blood supply. Measurements of coronary blood composition indicate the absence of myocardial ischemia. Myocardial elasticity is also noted to increase during increases in coronary blood supply. A.L.W.

**A82-31158 †** **Relation of changes in autonomic reactions to the effectiveness of mental activity under conditions of emotional stress (Sviaz' izmenenii vegetativnykh reaktsii s effektivnost'iu umstvennoi deiatel'nosti v usloviiakh emotsional'nogo napriazheniia).** E. V. Belova and G. B. Golovanova (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 247-252. 11 refs. In Russian.

**A82-31159 †** **Effects of starvation on human tolerance to acute hypoxia (Vliianie golodaniia na perenosimost' chelovekom ostroi gipoksii).** A. Iu. Katkov. *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 253-257. 13 refs. In Russian.

The effects of various periods of alimentary starvation on human tolerances to extreme levels of acute hypoxia are investigated. Subjects were exposed to stepwise increasing and continuously increasing simulated altitudes of up to 10,000 m in a pressure chamber or to nitrogen breathing until the onset of impairments in mental functioning following fasts of 4 and 14 days duration. Four-day fasting is found to increase human tolerance levels to both stepwise and rapidly increasing hypoxia, without influencing the maximum duration of nitrogen breathing. The 14-day fast, on the other hand, sharply increased human tolerance to rapidly increasing hypoxia, particularly at rest, and more than doubled tolerance times for nitrogen breathing. The fundamental source of the antihypoxic effect of 4-day starvation is thus identified with a state of metabolic acidosis, while the antihypoxic effect of the 14-day fast is attributed to a reduction in oxygen demand and a slowing of deoxygenation as a result of a reduced ventilatory response to hypoxemia. A.L.W.

**A82-31160 †** **Cardiac rhythm regulation at rest and during orthostasis (O reguliatsii serdechnogo ritma v pokoe i pri ortostaze).** V. R. Veber and Iu. G. Gaevskii (Semipalatinskii Meditsinskii Institut, Semipalatinsk, Kazakh SSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 258-261. 10 refs. In Russian.

A differential study is presented of the mechanisms of autonomic regulation providing for the stability of the cardiac rhythm at rest, the transition to orthostasis, and the secondary stabilization of the rhythm in orthostasis. Orthostatic intervalograms were derived from electrocardiographic R-R intervals measured in normal subjects including those who had received the autonomic nervous system blockers obzidane or atropine. The blockade of sympathetic inputs by obzidane is found to induce a shift in the resting pulse curve to the right on the pulsogram and an increase in pulse variability. An increase in sympathetic inputs provided by atropine shifts the curve to the left and decreases variability, as does the orthostatic test. The autonomic system blockers are also found to produce opposite effects on the pattern of heart rhythm variations during the transition from rest to orthostatic stability. Results demonstrate the roles of the sympathetic and parasympathetic nervous systems in the control of heart rhythms, and indicate the presence of different mechanisms controlling heart rate and its stability. A.L.W.

**A82-31161 †** **The voluntary regulation of heart rate (K voprosu o proizvol'noi reguliatsii chastoty serdechnykh sokrashchenii).** N. K. Stepanov, A. M. Zingerman, D. N. Menitskii, and K. F. Peskovskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 262-269. 35 refs. In Russian.

The possibility of and probable mechanisms for the voluntary control of heart rate are investigated. Subjects seated in a semi-darkened room were asked to control the position of a beam on an oscillograph screen representing the cardiointervalogram of the subject recorded by an electrocardiograph. Results demonstrate the possibility of the voluntary stabilization, reduction and increase of heart rate, with increases more successfully produced than reductions. Analysis of pneumogram, electromyogram, and EEG data and blood pressure measurements indicates the reduction in heart rate to be accomplished by a general systemic weakening, and it is proposed that giving instructions as to this effect will lead to a more marked heart rate reduction. The voluntary quickening of heart rate appears to be a component of the nonspecific activation mechanism, which is evidently a part of the respiratory-cardiac reflex. It is also noted that functional destabilization of regulatory systems is a necessary condition for the directed self-regulation of heart rate. A.L.W.

**A82-31162 †** **An approach to the determination of the reflex reactions of cardiac rhythm (Ob odnom podkhode k opredeleniiu reflektornykh reaktsii serdechnogo ritma).** E. I. Shul'man, M. Iu. Gel'tsel', and M. B. Shtark (Akademiia Meditsinskikh Nauk SSSR; Akademiia Nauk SSSR, Institut Avtomatiki i Elektrometrii, Novosibirsk, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 270-274. 8 refs. In Russian.

A methodological approach is proposed for the determination of the reflex reaction of the cardiac rhythm to short-duration stimuli. The approach is based on the fact that changes in the R-R interval are synchronous with respiratory phases, so that at rest the difference between two adjacent R-R intervals in a given respiratory phase is relatively stable in a given individual and condition. This proposal has been verified by a study of the distribution characteristics of differences in adjacent R-R intervals during inspiration, pause and expiration over the course of 20-40 min, in which the histograms of the distribution were found to show little scatter or displacement from zero. A.L.W.

**A82-31163 †** **Evaluation of object size upon viewing through an aperture (Otsenka razmera ob'ekta pri rassmatrivanii cherez aperturu).** V. D. Glezer, N. B. Kostelianets, and Iu. I. Levkovich (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 309-314. 11 refs. In Russian.

Factors influencing the illusory diminution of object size when the object is viewed with a limited portion of the retina or through a slit are investigated. Experiments involved the sequential presentation of portions of an equilateral triangle through moving circular apertures of various sizes to a group of 10 observers, who were asked to judge the size of the triangle based only on their views of portions through the aperture. Object size is found to be consistently underestimated when the object was viewed through the moving aperture. Comparison of data obtained in the presence and absence of the aperture indicates that the image size underestimation was due to two factors: the short viewing time for each image segment and the size of the aperture. Data thus support the existence of two mechanisms of size estimation, localized in the exterior geniculate body and the visual cortex. A.L.W.

**A82-31164 †** **Color fusion under conditions of equal brightness (Sliianie tsvetov v usloviiakh ravenstva po iarkosti).** A. V. Bertulis, Ia. M. Bertulene, and R. I. Tsitvaras (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 315-319. 7 refs. In Russian.

The resolving power of the human eye under conditions where the color regions to be distinguished are of equal brightness is studied. Experiments involved color fields and rectangular grids consisting of bands of various monochromatic colors, with subjects asked to observe the sharpness of color boundaries as the colors change in relative brightness in the first case, and to compare the brightnesses of different colors in overlapping grids in the second. The boundary between different colors is observed to be less well perceived when the colors are of equal subjective brightness than in the case of a color gradient. Color bands of a spatial frequency greater than 10-13/deg are not distinguished if they are of equal subjective brightness. A decrease in the wavelength difference of the two colors decreases the critical frequency for color fusion, at which the two original colors are blended and a new color is perceived. The fusion effect may be used to measure spectral sensitivity. A.L.W.

**A82-31165 †** **Characteristics of iron and copper metabolism during athletic training (Osobennosti obmena zheleza i medi pri sportivnoi trenirovke).** V. Ia. Rusin, V. V. Nasolodin, and V. A. Vorob'ev (Iaroslavskii Gosudarstvennyi Universitet, Yaroslavl, USSR). *Fiziologiia Cheloveka,* vol. 8, Mar.-Apr. 1982, p. 326-332. 18 refs. In Russian.

The effects of athletic training on iron and copper metabolism in men and women are investigated. Determinations of blood iron and copper levels and iron and copper balances were made at various times of the year in untrained controls and in highly trained male and female skiers. Iron content in the formed elements of the blood is observed to vary with time of year in male athletes, being greatest in the fall-winter period, and in female athletes and untrained women, where it is greatest in the summer and fall. Changes in copper levels are less marked. The concentrations of iron and copper in the blood cells of all men were higher than in women, with the greatest difference between trained groups occurring during the period of intensive training. Shifts in blood trace element levels after competition are also observed to be greater in women than in men, while women absorbed more nutritive iron following competition. Results justify the use of dietary trace element supplements in athletes, particularly females, during all phases of training. A.L.W.

**A82-31388** **A selective attention test as a predictor of success in flight training.** D. Gopher (Technion - Israel Institute of Technology, Haifa, Israel). *Human Factors,* vol. 24, Apr. 1982, p. 173-183. 9 refs.

in the pilot selection test battery of the Israeli Air Force was studied using a group of 2000 flight cadets. In this test, subjects are presented with 48 auditory messages. Each message is composed of strings of words and digit names. Different strings are simultaneously presented to the two ears. Subjects are required to detect digit names in the relevant channel and to reconsider channel relevance upon indication. Three types of selective listening errors are recorded: omissions, intrusions, and switching errors. Flight cadets who had completed a two-year training program had significantly lower error scores on all attention measures. In addition, these measures had low correlations with all other tests of the pilot selection battery. Thus, attention capabilities appear to be an independent dimension that enhances the predictive validity of the present test battery. (Author)

**A82-31389** **Performance effects of noise intensity, psychological set, and task type and complexity.** V. J. Gawron (Calspan Advanced Technology Center, Buffalo, NY). *Human Factors,* vol. 24, Apr. 1982, p. 225-243. 70 refs. NSF Grant No. DAR-78-12722.

Knowledge of the effect of noise on performance is limited and is generally inconclusive. Examination of previous research indicated the need for a systematic and concurrent investigation of the effects of psychological set, type of task, task complexity (single or dual task), and noise intensity. Three states of psychological set were established by telling groups of eight subjects each that noise degrades, facilitates, or has no effect on performance. A control group was told nothing about noise effects. Three intensities of broad-band white noise (55, 70, 85 dBA) were presented over loudspeakers to each subject during the completion of a four-task, adaptive-criterion battery. The only significant main effect of noise was a facilitation of tracking performance. There were several significant interactions of noise with the other independent variables. (Author)

**A82-31412** **Adaptation in motion perception - Alteration of motion evoked by ocular pursuit.** J. Bacon (Tufts University, Medford, MA) and H. Wallach (Swarthmore College, Swarthmore, PA). *Perception and Psychophysics,* vol. 31, no. 3, Mar. 1982, p. 251-255. NSF Grant No. BNS-79-24462.

A new perceptual adaptation, an alteration in the perceived direction of motion given by ocular pursuit, is reported. When an object starts to move on a straight path, its displacement is initially given by a shift of its image on the retinas of the stationary eyes; then, after about 200 msec, the eyes start to track the moving object. The perception of motion that results from ocular pursuit was altered by causing ocular pursuit of a moving object to be preceded regularly by a displacement of the object's image whose direction differed from the direction of the pursuit movement. This was arranged by changing the direction of the given motion at approximately the moment when image displacement changed into tracking. Prolonged exposure to such conditions resulted in a change of the tracked motion's apparent direction, which became somewhat more like the direction of the preceding motion phase that was given by image displacement. (Author)

**A82-31447** **Visual depth sensitivities of various cues for depth perception.** S. Nagata (Japan Broadcasting Corp., Broadcasting Science Research Laboratories, Tokyo, Japan). *NHK Laboratories Note,* Oct. 1981. 10 p. 13 refs.

A common scale for evaluating the availability of the depth cue in visual perception is proposed. The depth sensitivity (DS) is a ratio scale expressed as the viewing distance/the detection threshold of depth distance. The DS is intended as an empirical grounds for comparing the relative effectiveness of cues, e.g., motion parallax, retinal image size, accommodation, and brightness, for discerning relative depth. It is assumed that valid changes in depth perception retain visual characterization of the object and that the just-noticeable difference corresponds to the depth sensation on each cue for the visual distance. Two subjects were engaged in trials of depth perception of projected objects viewed through a slit or artificial pupil, covering all known depth cues in individual tests. Binocular parallax was most sensitive up to 10 m, while motion parallax was best at 8 deg/sec, with a sensitivity exceeding binocular parallax at 10 m. M.S.K.

**A82-31486** † **Reflection of individual characteristics of human and animal higher nervous activity in the nature of heart rate changes (Otrazhenie individual'nykh osobennostei vysshei nervnoi deiatel'nosti cheloveka i zhivotnykh v kharaktere izmenenii chastoty serdechnykh sokrashchenii).** N. V. Makarenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Mar.-Apr. 1982, p. 176-182. 14 refs. In Russian.

The relation between individual patterns of higher nervous activity and the characteristics of autonomic responses are studied by the measurement of heart rate in humans processing various amounts of visual information and in dogs during the establishment of conditioned reflexes. In dogs, changes in R-R interval duration and heart rate during the development and reinforcement of positively conditioned reflexes are found to be directly dependent on the intensity of the stimulation process in the individual animal. Humans with a high level of nervous system mobility exhibit a significantly greater pulse reactivity upon the solution of problems with a time limit than those who exhibit low mobility. Results may be used in the development of a method for the evaluation of the psychophysiological stress of a human operator in a man-machine system and in operator selection and training. A.L.W.

**A82-31487** † **Age characteristics of fatigue during local muscular work in humans (Vozrastnye osobennosti utomleniia pri lokal'noi rabote myshts u cheloveka).** T. V. Alferova (Cheliabinskii Institut Fizicheskoi Kul'tury, Chelyabinsk, USSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Mar.-Apr. 1982, p. 230-236. 14 refs. In Russian.

Functional changes in the cardiovascular and respiratory systems and the motor apparatus during local muscular work in persons of different ages are investigated. Electrocardiography, arterial pressure measurements, oxyhemography during a breath-holding test and electromyography were used to assess work capacity in persons of nine age groups from 4 to 95 years performing static and dynamic work on a digital ergograph to exhaustion, and in children doing school work. Variations with age in muscle power, mean load, work performed, fatigue and endurance indicate that work capacity in persons of different ages is determined by the unequal development of different motor capacities as well as differences in the regulation of fatigue processes. Blood supply to working muscles is maintained in young children by an increase in heart rate, in juveniles and adults by increases in blood pressure, while in the elderly circulation remains practically unchanged. Changes in fatigue patterns are observed in school children following lessons, which correspond to increased fatigueability, decreased endurance and a high volume of ergographic work performed. A.L.W.

**A82-31494** † **Changes in psychophysiological functions of flight personnel under various regimes of active rest (Izmenenie psikhofiziologicheskikh funktsii u lits letnogo sostava pri razlichnykh rezhimakh aktivnogo otdykha).** N. I. Frolov, A. N. Kol'tsov, and S. V. Babenin. *Voenno-Meditsinskii Zhurnal,* Mar. 1982, p. 42-44. In Russian.

The effects of various intensities and regimes of exercise during rest at a sanitorium on the psychophysiological condition of flight personnel are investigated. Programs consisting of morning drills, training on special apparatus, rowing, swimming, tourism and sports were assigned to subjects grouped on the basis of initial physical condition and age, and performed at various intensities. The active rest regimes are found to be more beneficial than passive rest, leading to more rapid reductions in complaints of fatigue, irritability and exercise fatigue, improvements in subjective well-being, reductions in heart rate and arterial pressure, increases in stroke and minute blood volumes and breath holding time, improvements in cardiovascular adaptation to exercise, increases in visual discrimination, and static muscular endurance and reductions in reaction time and tremors. The degree of improvement is observed to depend on exercise intensity within each group, and to be greatest in overweight persons. A.L.W.

**A82-31495** † **Some indicators of human adaptation to humid tropical conditions (O nekotorykh pokazateliakh adaptatsii cheloveka k usloviiam vlazhnykh tropikov).** V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal,* Mar. 1982, p. 46-47. 10 refs. In Russian.

**A82-31501** **Discrete models of a human operator /Survey of foreign research/.** I. E. Tsibulevskii. *(Avtomatika i Telemekhanika,* Sept. 1981, p. 111-132.) *Automation and Remote Control,* vol. 42, no. 9, Feb. 20, 1982, pt. 2, p. 1226-1241. 16 refs. Translation.

Discrete models of the human operator which include both a perception of the input signal and discrete control signals at the output are reviewed. The model of Bekey (1962) is shown to encompass a transfer function with a clamping element of zero order converted into an element of the first order, while the neuromuscular element is represented by an inertial unit with a gain and time constant. Wilde and Wescott (1963) developed a predicting model based on the assumptions that visual information is separated by discrete time intervals, impulses for movement from the brain are dispatched in equal periods of time, and the programs of motion are configured to have the motion begin at a particular time in the future. Further attention is given to the details of pursuit tracking model, for tracking with a preview, a model with finite states, and a model in which pulse corrections are introduced for the velocity value at the output. M.S.K.

**A82-31502** † **Nutrition and athletics (Pitanie i sport).** K. A. Korovnikov, K. A. Laricheva, and N. I. Ialovaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Mar. 1982, p. 18-20. 24 refs. In Russian.

The nutrients ingested by athletes not only must compensate for the energy expended, they must also regulate the body's metabolism so that the various functional systems operate as economically as possible. Recent dietary theories advocating fasting are discussed. Fasting is decried because it interrupts precisely coordinated metabolic processes, in particular, the metabolism of proteins, and leads to an accumulation of the toxic products of intermediate metabolic steps. It also disturbs the electrolytic balance and interferes with the enzyme system, cell membranes, and the metabolism of vitamins. Diets calling for only certain classes of foods at a given time are deprecated, and their adverse physiological effects are listed. The experimentally verified principles underlying the type of diet that an athlete should have are expounded. A brief physiological description of the way in which carbohydrates, proteins, fats, and certain branched-chain amino acids provide energy to the muscles is included. C.R.

**A82-31503** † **A comparative characterization of hemodynamics and respiration under static and dynamic loads (Sravnitel'naia kharakteristika gemodinamiki i dykhaniia pri staticheskikh i dinamicheskikh fizicheskikh nagruzkakh).** A. B. Gandel'sman, T. A. Evdokimova, N. Kh. Sidorova, and A. P. Karpov (Gosudarstvennyi Institut Fizicheskoi Kul'tury; I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Mar.

1982, p. 24-28. 22 refs. In Russian.

It is pointed out that a combination of static and dynamic loads is at work when the muscles are used in motor activity. The individual contributions of these loads to the changes that occur in respiration and hemodynamics are investigated. A bicycle ergometer provides the dynamic load; the static load comes from pressing the handle of an electrodynamometer for 1 min. The average arterial pressure is found to increase more for static loads than for dynamic loads. The consumption of O2, here used to assess respiration, is greater with dynamic loads. It is concluded that, with static loads, vascular-reflector reactions predominate; with dynamic loads, the main reactions are respirative-energetic. C.R.

**A82-31504** † **The functional reserves of athletes (Problema funktsional'nykh rezervov sportsmenov).** A. S. Mozzhukhin (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Mar. 1982, p. 49-51. In Russian.

The abilities that manifest themselves under extremely unusual or threatening circumstances are discussed. These reserves are classified here according to origin (biological and social) and type (functional and structural). It is pointed out that this first distinction is somewhat arbitrary since social reserves have a biological basis. Social reserves are in turn subdivided into psychic reserves, which are related to motivation, and reserves that depend upon a person's professional ability. In discussing functional reserves, a distinction is made between those that are biochemical and those that are physiological. In the case of athletes, it is pointed out that all the factors making up the reserves can be altered through training. A fuller knowledge of the way in which these reserves come into play could therefore be used to improve training programs. C.R.

**A82-31505** † **Changes in the peroxide metabolism of weight-lifters and wrestlers under the conditions of systematic muscular activity (Izmenenie perekisnogo obmena u tiazheloatletov v usloviiakh sistematicheskoi myshechnoi deiatel'nosti).** V. E. Kal'nitskaia (Krasnodarskii Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, Mar. 1982, p. 28-30. 8 refs. In Russian.

**A82-31506** † **The biological and therapeutic effect of microwaves (O biologicheskom i lechebnom deistvii mikrovoln).** A. N. Obrosov and O. A. Krylov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 1-6. In Russian.

The deep penetration of microwaves is regarded as a distinctive feature. But since the depth depends on a large number of factors, studies carried out on animals can not readily be used in assessing the effect on man. In medical experiments, the temperature change in the tissue or organ subjected to radiation is considered the most reliable indicator of intensity. Tissues that are unable to release heat are usually the ones damaged by microwaves. Microwaves also have the effect of lowering arterial pressure. Experiments on rats showing that microwaves inhibit myocardial infarction are described. Reference is also made to studies showing that microwaves counteract certain physiological irregularities associated with hypertension. C.R.

**A82-31507** † **Decimetric waves in the combined therapy of patients with cerebral circulatory insufficiency (Volny detsimetrovogo diapazona v kompleksnom lechenii bol'nykh s nedostatochnost'iu mozgovogo krovoobrashcheniia).** N. I. Strelkova (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 28-31. 11 refs. In Russian.

**A82-31508** † **The state of vegetative functions with hypertension under the action of decimetric waves on the region of the brain /Experimental study/ (Sostoianie vegetativnykh funktsii pri gipertenzii pod deistviem voln detsimetrovogo diapazona na oblast' golovnogo mozga /Eksperimental'noe issledovanie/).** M. S. Golinskaia. *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 25-28. 8 refs. In Russian.

The experiment is carried out on rats. With comparatively small intensities of decimetric waves, coordinated changes are observed between the hypotensive action, the frequency of heart contractions, the rhythm of respiration, and energy metabolism. With an intensity up to 400 mW/sq cm, the progressive lowering of the maximum systolic pressure does not accord with hemodynamics indicators, the rhythm of respiration, and other vegetative reactions. C.R.

**A82-31509** † **The effect of decimeter waves and sinusoidal modulated currents on the nuclear DNA content of cerebral nerve cells /Experimental study/ (Deistvie voln detsimetrovogo diapazona i sinusoidal'nykh modulirovannykh tokov na soderzhanie iadernoi DNK nervnykh kletok golovnogo mozga /Eksperimental'noe issledovanie/).** L. V. Mikhailik (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 22-25. 7 refs. In Russian.

**A82-31510** † **Effects of decimetric waves on the temperature of the brain and adjoining tissues /Experimental study/ (Vliianie detsimetrovykh voln na temperaturu golovnogo mozga i prilezhashchikh tkanei /Eksperimental'noe issledovanie/).** S. N. Malikova, V. L. Malyshev, V. N. Balakireva, and L. G. Gorban' (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 18-22. In Russian.

Temperature changes in the brain and adjoining tissues of animals and phantoms exposed to decimetric radiation are determined as a measure of energy absorption. Experiments were performed on wood shavings moistened by a physiological solution, anesthetized rabbits and dogs and animal corpses exposed to 400, 1200 or 2000 mW/sq cm decimetric radiation localized on the temporo-parietal region for up to 30 min. Comparison of the spatial and temporal patterns of temperature increase in the phantoms and corpses on the one hand with those in live animals on the other reveals the effects of decimetric waves to depend not only on the intensity and duration of the irradiation, but on the nature and condition of the cerebral blood cooling system. A.L.W.

**A82-31511** † **Immunodepressive and immunostimulatory effects of decimetric waves on the primary immunological response (Immunodepressivnoe i immunostimuliruiushchee deistvie voln detsimetrovogo diapazona pri pervichnom immunologicheskom otvete).** V. M. Bogoliubov, I. D. Frenkel', S. B. Pershin, Iu. T. Ponomarev, Z. A. Sokolova, S. M. Zubkova, S. N. Kuz'min, A. I. Galenchik, and N. N. Kozlova (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii; Moskovskii Nauchno-Issledovatel'skii Institut Vaktsin i Syvorotok, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 13-17. 10 refs. In Russian.

The effects of irradiation by decimetric waves at various localizations on processes of immunogenesis in the primary immunological response are investigated. Experiments involved rabbits exposed to 120 mW/sq cm of 460 MHz radiation for 6 min daily, then injected with thymus-dependent sheep erythrocyte antigen. The effects of decimetric wave irradiation on the immune response are found to depend not only on the site of irradiation, but on the stage of the process at which the radiation is received. Irradiation of the projection zone of the thyroid gland during the production and induction phases of immunogenesis induces an immunodepression, while during the period preceding immunization it stimulates the immune response. In contrast, radiation of the projection zone of the adrenals at any period before or after antigen injection leads to the development of an immunodepressive effect by the stimulation of glucocorticoid functions. A.L.W.

**A82-31512** † **The effect of decimeter waves on the functional state of the cardiovascular system, and some biochemical and immunological indices of patients with myocardial infarction in the recovery phase (Vliianie voln detsimetrovogo diapazona na funktsional'noe sostoianie serdechno-sosudistoi sistemy, nekotorye biokhimicheskie i immunologicheskie pokazateli bol'nykh infarktom miokarda v faze vyzdorovleniia).** E. I. Sorokina, N. B. Poshkus, Iu. Iu. Tupitsina, L. P. Volkova, A. V. Shubina, and V. E. Krasnikov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Mar.-Apr. 1982, p. 9-13. 9 refs. In Russian.

**A82-31513** † **Changes of cardiac activity and regional cerebral circulation under gravitational effects simulated by anti-**

**orthostasis (Izmeneniia serdechnoi deiatel'nosti i regionarnogo krovoobrashcheniia golovy pri gravitatsionnykh vozdeistviiakh, modeliruemykh).** B. M. Fedorov and T. B. Sebekina. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Mar.-Apr. 1982, p. 3-10. 49 refs. In Russian.

The use of antiorthostasis as a model of gravitational effects is considered. The positioning of the trunks of anesthetized dogs in an antiorthostatic posture at angles of -45 and -90 deg to the horizontal plane causes a sharp increase of pressure in the fourth ventricle of the brain, a decelerated rhythm of cardiac contraction, increased peripheral resistance of branches of the carotid artery, and a sharp increase of the pressure in the jugular veins. Under antiorthostasis conditions, the increased resistance in the branches of the carotid artery and deceleration of the volumetric rate of circulation in them may be considered an emergency compensatory reaction preventing the overfilling of the cerebral vessels with blood. B.J.

**A82-31514** † **Specialized acidophilic products for the nourishment of athletes (Spetsializirovannye atsidofil'nye produkty dlia pitaniia sportsmenov).** M. Ia. Brents, I. P. Slavgorodskaia, N. N. Kalinina, M. F. Verzhinskaia, O. I. Luchkina, A. P. Ekimovskii, S. N. Kulakova, Iu. P. Aleshko-Ozhevskii, and N. N. Makhova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Pitaniia,* Mar.-Apr. 1982, p. 18-21. In Russian.

**A82-31515** † **The energy requirements of railway-bridge assemblers (Potrebnost' v energii montazhnikov zheleznodorozhnykh mostov).** E. M. Ratner, A. B. Kirpichnikov, M. N. Evlampieva, G. I. Bondarev, D. M. Demina, K. M. Kopirovskii, and N. P. Feoktistova (Ministerstvo Putei Soobshcheniia, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Pitaniia,* Mar.-Apr. 1982, p. 25, 26. In Russian.

**A82-31516** † **Ways to improve therapeutic and prophylactic assistance to water-transport workers (Puti sovershenstvovaniia lechebno-profilakticheskoi pomoshchi rabotnikam vodnogo transporta).** Iu. L. Zabin (Ministerstvo Zdravookhraneniia RSFSR, Otdel Lechebno-Profilakticheskoi Pomoshchi Rabotnikam Vodnogo Transporta, Moscow, USSR). *Sovetskoe Zdravookhranenie,* no. 3, 1982, p. 23-28. In Russian.

**A82-31517** † **Competition between algae in a flow system (Konkurentsiia mezhdu vodorosliami v protochnoi sisteme).** V. V. Alekseev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and T. G. Sazykina (Akademiia Nauk SSSR, Institut Atomnoi Energii, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 43, Mar.-Apr. 1982, p. 205-211. 5 refs. In Russian.

**A82-31518** † **Hormonal mechanisms of seasonal rhythms in rats (Gormonal'nye mekhanizmy sezonnykh ritmov u krys).** V. V. Vinogradov (Akademiia Nauk Belorusskoi SSR, Otdel Reguliatsii Obmena Veshchestv, Grodno, Belorussian SSR). *Zhurnal Obshchei Biologii,* vol. 43, Mar.-Apr. 1982, p. 197-204. 31 refs. In Russian.

Seasonal variations in blood corticosteroid levels and pentose phosphate pathway enzyme activities are studied in rats kept at a constant temperature of 20 C and 12-hr light cycle throughout the year. The activities of glucose-6-phosphate dehydrogenase and 6-phosphoxgluconate dehydrogenase in the liver, kidneys, brain and spleen are observed to peak in the summer and autumn and reach a minimum in the winter and spring months. Corticosterone production is found to rise from April to October, although peripheral dehydrogenase activation takes place from June-July through December-January. Results are explained by the dependence of enzyme activities on hormone levels and their relation to patterns of pancreatic insulin secretion, which is in turn closely related to the seasonal rhythmicity of the hypothalamic-adrenal system. It is further concluded that the temporal matching of the yearly cycle of hypothalamic-adrenal activity with the yearly environmental cycle takes place according to a stress mechanism. A.L.W.

**A82-31519** † **Clinical features of the effect of factory noise as a function of its type and spectral characteristics (Klinicheskie osobennosti deistviia proizvodstvennogo shuma v zavisimosti ot ego kharaktera i spektral'noi kharakteristiki).** Zh. S. Kanevskaia, V. A. Koroleva, and E. L. Sineva (Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Mar. 1982, p. 24-27. In Russian.

**A82-31520** † **The state of hearing in pilots in civil aviation (O sostoianii slukha u pilotov grazhdanskoi aviatsii).** Iu. N. Kamenskii, V. M. Kozin, and O. V. Kozin (Institut Grazhdanskoi Aviatsii, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Mar. 1982, p. 51-53. 14 refs. In Russian.

**A82-31521** † **Individual sensitivity to noise (K voprosu ob individual'noi chuvstvitel'nosti k shumu).** Iu. P. Syromiatnikov (Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Mar. 1982, p. 27-31. 7 refs. In Russian.

The paper examines individual variants of the growth rate of the constantly shifted auditory threshold (CSAT) and of the regress of the provisionally shifted auditory threshold (PSAT) in factory workers (weavers) exposed to noise at 101 dB. Irrespective of individual sensitivity to noise, saturation of the acoustic analyzer and stabilization of hypoacousis were revealed in weavers after 10-12 years of work in the 4000 Hz band. An algorithm is derived which makes it possible to predict values of hypoacousis after any length of work under conditions of industrial noise on the basis of the initial PSAT values and corresponding values of CSAT growth. B.J.

**A82-31522** † **Features of the temporal organization of the activated phase of sleep in frogs and turtles (Osobennosti vremennoi organizatsii aktivirovannoi fazy sna u liagushki i cherepakh).** S. G. Lazarev (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 18, Mar.-Apr. 1982, p. 186-190. 8 refs. In Russian.

**A82-31523** † **The formation in human ontogeny of the ability to reproduce a given rhythm (O formirovanii v ontogeneze cheloveka sposobnosti k vosproizvedeniiu zadannogo ritma).** V. P. Morozov, K. A. Zaitseva, and N. V. Sukhanova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 18, Mar.-Apr. 1982, p. 193-196. 9 refs. In Russian.

**A82-31524** † **Conditioned reflexes in albino rats during space flight (Uslovnye refleksy belykh krys vo vremia kosmicheskogo poleta).** Z. I. Apanasenko, M. A. Kuznetsova, E. S. Meizerov, and L. V. Serova. *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 32, Mar.-Apr. 1982, p. 263-268. 12 refs. In Russian.

The state of conditioned reflex activity in rats during exposure to space flight conditions is investigated. Albino rats who had been conditioned to sounds and light flashes signalling the appearance of food were flown on board the Cosmos 1129 biosatellite for a period of 18.5 days, and the state of the reflex was evaluated according to the latency and intensity of the response to different signal levels. During the flight, a reduction in the level of conditioned reflex activity was observed: the number of omissions increased while the magnitude of the response decreased and the latency increased. By the 7th-12th day of flight, the normal intensity relations had been impaired by phase equalization, and a tendency towards the disinhibition of differentiation was noted. The changes may be explained by a weakening of both nervous processes fundamental to the reflex, with the more sensitive inhibitory process more affected than the excitatory process. A.L.W.

**A82-31525** † **The organ of vision and medicines used in treating psychological disorders /Survey/ (Lekarstvennaia terapiia psikhicheskikh zabolevanii i organ zreniia /Obzor/).** I. L. Gol'dovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 82, Mar. 1982, p. 119-126. 125 refs. In Russian.

It is noted that cases of extreme damage to the eyes from medicines used in treating psychological disorders are becoming scarcer as the toxic side effects of these medicines become known. The effects, both immediate and long-term, of chlorpromazine hydrochloride are discussed, noting that large doses can damage the cornea. Attention is also given to the effect on the eye of tranquilizers, antidepressants, and lithium salts. C.R.

**A82-31526** † **Effects of hyperbaric oxygenation on homocarnosine metabolism in the brains of rabbits of various ages (Vliianie**

**giperbaricheskoi oksigenatsii na obmen gomokarnozina v mozgu krolikov raznogo vozrasta).** A. A. Krichevskaia, T. I. Bondarenko, N. V. Malysheva, and I. A. Pozhematkina (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Voprosy Meditsinskoi Khimii,* vol. 20, Mar.-Apr. 1982, p. 125-128. 17 refs. In Russian.

**A82-31527 † Adaptation of skeletal and cardiac muscle to elevated motor activity in hypo- and athyreotic rats (Adaptatsiia skeletnykh i serdechnoi myshts k povyshennoi dvigatel'noi aktivnosti u gipo- i atireoidnykh krys).** T. P. Seene, K. P. Alev, K. E. Tomson, and A. A. Viru (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Voprosy Meditsinskoi Khimii,* vol. 20, Mar.-Apr. 1982, p. 20-24. 23 refs. In Russian.

**A82-31528 † Preventing disturbances to the structure of DNA in the cardiac muscle from emotional-nociceptive stress by blocking beta-adrenoreceptors and the peroxidation of lipids (Preduprezhdenie narushenii struktury DNK serdechnoi myshtsy, vyzvannykh emotsional'no-bolevym stressom s pomoshch'iu blokady beta-adrenoretseptokov i perekisnogo okisleniia lipidov).** F. Z. Meerson and V. K. Vasil'ev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii,* vol. 20, Mar.-Apr. 1982, p. 115-118. 15 refs. In Russian.

**A82-31529 † Mechanism for fluctuations in cell cycle duration (O mekhanizme fluktuatsii dlitel'nosti kletochnogo tsikla).** E. I. Volkov and A. T. Mustafin (Akademiia Nauk SSSR, Fizicheskii Institut, Moscow, USSR). *Biofizika,* vol. 27, Mar.-Apr. 1982, p. 304-308. 15 refs. In Russian.

Fluctuations in the duration of the cell cycle are examined in terms of a dynamic model of the membrane regulation of cell division. The model is based on the oxidation of membrane lipids as the principal self-oscillation process determining the rate of cell division according to changes in lipid mobility. The presence of white noise in the parameters determining the influxes of lipids and antioxidants in the membrane is simulated by methods of Markov processes and probability modeling. An equation for the distribution of cell generation times is obtained and the increase in dispersion and mean cycle time upon variations in system parameters related to the density of cell cultures is calculated. Results are in qualitative agreement with experimental data. A.L.W.

**A82-31530 † Calculation of the isochromatics and isoclinics of the cornea (Raschet izokhrom i izoklin rogovoi obolochki glaza).** M. A. Pen'kov, G. M. Altukher, and M. L. Kochina (Khar'kovskii Meditsinskii Institut, Kharkov, Ukrainian SSR; Nauchno-Issledovatel'skii Institut Prirodnykh Gazov, Moscow, USSR). *Biofizika,* vol. 27, Mar.-Apr. 1982, p. 313-316. 11 refs. In Russian.

A method is presented for calculating tensions in the cornea induced by the mechanical influence of oculomotor muscles and intraocular pressure. The influence of the gradient thickness of the cornea on the shape of isochromatics is determined, and the nature of the cornea cross, representing lines of principal tensions (isoclinics), is investigated. The method is suitable for calculating the tensions of both healthy eyes and eyes with oculomotor pathology. B.J.

**A82-31531 † Theoretical conformational analysis of the neuropeptide inducing delta sleep (Teoreticheskii konformatsionnyi analiz neiropeptida, indutsiruiushchego del'ta-son).** A. A. Akhrem, S. G. Galaktionov, V. P. Golubovich, and L. I. Kirnarskii (Akademiia Nauk Belorusskoi SSR, Institut Bioorganicheskoi Khimii; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Genetiki i Selektsii Promyshlennykh Mikroorganizmov, Minsk, Belorussian SSR). *Biofizika,* vol. 27, Mar.-Apr. 1982, p. 324, 325. In Russian.

**A82-31532 † Effects of creatine phosphate on action potential duration and myocardial contractile force in the frog under hypoxia (Vliianie kreatinfosfata na dlitel'nost' potentsialov deistviia i silu sokrashcheniia miokarda liagushki pri gipoksii).** V. I. Genovilene and E. V. Narushevichus (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Mar. 1982, p. 3-5. 7 refs. In Russian.

**A82-31533 † Dynamics of changes in animal body mass and skeletal musculature under conditions of hypokinesia (Dinamika izmenenii massy tela zhivotnykh i ikh skeletnoi muskulatury v usloviiakh gipokinezii).** E. V. Kocherezhkina (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Mar. 1982, p. 118, 119. 14 refs. In Russian.

The responses of body mass and the skeletal musculature of young animals growing under conditions of limited motor activity are traced in rats kept in restrictive cages for a period of 2 months. Animals maintained in cages preventing them from turning around exhibited signs of a high stress reaction and lost a significant amount of weight after three weeks, after which the experiment was terminated. Those given slightly more room showed signs of adaptation after several days and a weight gain from 125 to 180 g after 2 months, whereas control animals showed a weight gain to 330 g in the same time period. Muscular indexes and gastrocnemius muscle masses are also observed to be greater in the controls. Results demonstrate the influence of hypokinesia on muscle growth, and are supported by the discovery of smaller muscle fiber diameters in the constrained rats. A.L.W.

**A82-31534 † Experimental model with a supplementary source of endogenous serotonin (Eksperimental'naia model' s dopolnitel'nym istochnikom endogennogo serotonina).** N. K. Popova, N. N. Kudriavtseva, T. V. Guvakova, and N. M. Enishevskaia (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki; Novosibirskii Gosudarstvennyi Universitet, Novosibirsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Mar. 1982, p. 99-101. 11 refs. In Russian.

An experimental model providing a long-term source of supplementary endogenous serotonin is presented. The model makes use of gastrointestinal tract sections from embryo mice transplanted under the skin of adult mice of the same strain as sources of additional serotonin. Morphological studies of transplants after 30-40 days have shown them to be similar in cell composition to the corresponding sections of intact embryos, particularly as regards the serotonin-containing enterochromaffin and mast cells. Biochemical studies have shown the presence of serotonin in the transplants, and elevated serotonin levels in the blood, although not the brain, of the recipients. The model is thus suitable for studies of the role of serotonin in the peripheral regulation of physiological systems. A.L.W.

**A82-31535 † The role of lymphocytes in the regeneration of hematopoiesis under condition of local irradiation (Ob uchastii limfotsitov v regeneratsii krovetvoreniia v usloviiakh lokal'nogo obluchenii organizma).** E. D. Gol'dberg and A. M. Dygai (Tomskii Meditsinskii Institut, Tomsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Mar. 1982, p. 97-99. 13 refs. In Russian.

The role of lymphocytes in the regulation of the proliferation, differentiation and migration of hematopoietic stem cells following the local irradiation of the bone marrow is investigated. Experiments involved the evaluation of the numbers of nucleated cells in the thymus, spleen and bone marrow of mice exposed to a dose of 7.0 gram-roentgens of X radiation. An accumulation of lymphocytes is observed in the bone marrow of both irradiated and shielded limbs one day after irradiation, although by the fifth day lymphocyte numbers in the shielded limb were normal but rose sharply in the irradiated limb. Lymphocytosis in both irradiated and shielded hematopoietic tissues was less marked in thymectomized animals and in animals treated with antithymocytic heterologous serum, however was restored by the injection of viable thymocytes. The lymphocytosis observed after the first day had no effect on the colony forming activity of the hematopoietic tissues, while that developing on the fifth day stimulated colony-forming activity, apparently related to lymphocyte function in stimulating the regeneration of hematopoiesis. A.L.W.

**A82-31536 † Destructive and reparative processes in the hippocampus upon prolonged exposure to nonionizing microwave radiation (Destruktivnye i reparativnye protsessy v gippokampe pri dlitel'nom vozdeistvii neioniziruiushchikh mikrovolnovykh izluchenii).** V. S. Belokrinitskii (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Mar. 1982, p. 89-92. 7 refs. In Russian.

Ultrastructural changes in the brain upon long-term exposure to low doses of nonionizing microwave radiation are investigated. Electron microscopic examinations were conducted of the hippocampi of rats exposed to various intensities of 12.6-cm radiation for 40 min three times daily for a period of 2 months. Ultrastructural changes including vacuolization, regressive myelin transformation, nonequilibrium neurofibrillar stretching and fragmentation, mitochondrial swelling and darkening (densification) were observed in the alveus, polymorphic cell and pyramidal cell layers of the hippocampi of rats irradiated at 1000 microwatt/sq cm, and to lesser extents in animals irradiated at levels down to 10 microwatt/sq cm. The pattern of the changes demonstrates the presence of both destructive and reparative processes occurring simultaneously in the same cell, which may represent a mechanism of pathogenesis in humans exposed to environmental microwaves. A.L.W.

**A82-31537 † Electrophysiological studies of the auditory-receptor function in the case of the combined injection of kanamycin and lasix (Elektrofiziologicheskie issledovaniia funktsii slukhovogo retseptora pri sochetannom vvedenii kanamitsina i laziksa).** R. M. Khanamirian, B. I. Dunaivitser, and T. G. Tatevosian (Ministerstvo Zdravookhraneniia SSSR, Erevanskii Institut Usovershenstvovaniia Vrachei, Yerevan, Armenian SSR). *Vestnik Otorinolaringologii*, Mar.-Apr. 1982, p. 10-14. 13 refs. In Russian.

The effect of the combined intravenous injection of therapeutic doses of kanamycin and lasix on the cochlear bioelectric response was investigated in acute experiments on 30 cats. It is shown that the amplitude of microphone potentials responding to tonal stimulations of 250, 1000, and 5000 Hz and axonal potentials responding to short sound snaps decreases beginning with the 15th minute. A maximum decrease of the bioelectric amplitude is observed two to three hours after injection. Gradual, almost complete recovery of the amplitude in five hours was recorded. The results indicate that the ototoxic effect produced by the combined injection of therapeutic doses of kanamycin and lasix is reversible. B.J.

**A82-31538 † Electrometric studies of the human gustatory analyzer in healthy persons and in the simulation of weightlessness (Elektrometricheskoe issledovanie vkusovogo analizatora cheloveka v norme i pri modelirovanii nevesomosti).** I. Ia. Iakovleva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Vestnik Otorinolaringologii*, Mar.-Apr. 1982, p. 15-17. 9 refs. In Russian.

An electrogustometer was used to study the threshold sensitivity of taste receptors to electrical stimulation as well as gastrolingual reflex parameters for 62 healthy men aged 25 to 45. Fifty-three men were used as controls, while nine men were examined under conditions of strict bed rest during five days, with a bed head slope of 8 deg. This brought about a statistically significant increase in gustatory thresholds, and a change in the direction of the gastrolingual reflex (seven men) and its inhibition (two men). B.J.

**A82-31539 † Foreign body extraction from the left pterygopalatine fossa under fluoroscope control (Udalenie inorodnogo tela iz levoi krylonebnoi iamki pod kontrolem rentgenotelevizionnoi ustanovki).** M. V. Seniukov, V. G. Andreev, and M. V. Romanova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii*, Mar.-Apr. 1982. 1 p. In Russian.

**A82-31540 † Quantitative evaluation of hoarseness using a computer (Kolichestvennaia otsenka okhriplosti s ispol'zovaniem EVM).** V. D. Uloza, Iu. M. Otriashenkov, A. D. Ronzin, and B. V. Zubkov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii*, Mar.-Apr. 1982, p. 41-44. 19 refs. In Russian.

**A82-31541 † Investigation of the sensitivity of the vestibular apparatus to galvanic-current stimulation (Issledovanie chuvstvitel'nosti vestibuliarnogo apparata k razdrazheniiu gal'vanicheskim tokom).** Iu. P. Syromiatnikov and V. G. Ovakimov (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Vestnik Otorinolaringologii*, Mar.-Apr. 1982, p. 33-37. 16 refs. In Russian.

The use of vestibular galvanometry to examine a control group of practically healthy subjects has made it possible to determine vestibular thresholds of sensitivity to galvanic-current stimulation in women. Vestibular sensitization in response to the current was noted in subjects of the same occupation (weavers working for about 20 years), showing vegetovascular dysfunction after long-term exposure to low-frequency production-related vibration and noise. The use of the vestibular galvanometric method for the purpose of occupational screening is considered. B.J.

**A82-31542 † Eight-hour rhythm of autonomic regulation (Vos'michasovoi ritm vegetativnoi reguliatsii).** A. I. Bogatyr' (Kievskii Nauchno-Issledovatel'skii Institut Neirokhirurgii, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1982, p. 79-81. In Russian.

Twenty-one examinations of the dynamics of the rate of heart contractions in the course of 24 hours have been performed. An intradiurnal (ultradianic) rhythm with a period of about eight hours has been disclosed. Extremal values of the rhythm with an average probability of 0.83 were found at 1, 9, and 17 hours (sympathetic peaks) and at 5, 13, and 21 hours (parasympathetic peaks). B.J.

**A82-31543 † Psychotherapeutic use of sleep deprivation in treating insomnia produced by psychic soporific dependence (Ispol'zovanie deprivatsii sna v psikhoterapii bessonnitsy, vyzvannoi psikhicheskoi zavisimost'iu ot snotvornykh).** V. I. Litvinenko and A. P. Krylovskii (Geikovskaia Oblastnaia Psikhiatricheskaia Bol'nitsa, Dnepropetrovsk, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1982, p. 104-106. In Russian.

**A82-31544 † Paradoxical akinesia syndrome in cases of acute carbon monoxide poisoning (Sindrom paradoksal'noi akinezii pri ostrykh otravleniiakh okis'iu ugleroda).** A. A. Lomova, S. K. Evtushenko, Iu. G. Garina, R. A. Voinar, D. P. Terent'eva, S. A. Kharitonov, and A. A. Grishchenko (Donetskii Meditsinskii Institut; Oblastnaia Klinicheskaia Bol'nitsa Professional'nykh Zabolevanii, Donetsk, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1982, p. 101-103. 7 refs. In Russian.

**A82-31545 † Functional-morphological characteristics of microvessels of the rat liver under hypokinesia (Funktsional'no-morfologicheskie osobennosti mikrososudov pecheni krys v usloviiakh gipokinezii).** G. M. Knipshe (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, Mar. 1982, p. 50-56. 23 refs. In Russian.

Hypokinesia was produced in 66 non-inbred white rats by putting the animals in pencil boxes for 1, 2, and 4 weeks. Changes in specific volumes of various hepatic microvessels under hypokinesia and under hypokinesia combined with metaperon administration were investigated steriologically. The hypokinesia produced certain changes in the specific volume of all the hepatic microvessels studied, but the degree and character of the volumetric relations between the microvessels were different. Under metaperon administration, volumetric changes in the microvessels occurred with greater regularity. B.J.

**A82-31546 † Effects of high-frequency ultrasound on adaptive changes in cell resistance (Vliianie vysokochastotnogo ul'trazvuka na adaptivnye izmeneniia ustoichivosti kletok).** V. P. Plavinskis (Odesskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei i Tkanevoi Terapii, Odessa, Ukrainian SSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, Mar. 1982, p. 56-59. 8 refs. In Russian.

The reparative and protective effects of ultrasound on retinal cells are investigated in the light of the use of ultrasound in the treatment of several ocular conditions. Actinomycin D was used to induce metabolic disturbances in the retinas of rabbits which had either undergone multiple ocular exposures to ultrasound at a frequency of 880 kHz and intensity 0.4-0.6 W/sq cm, or subsequently underwent ultrasonic irradiation. Evaluations of RNA and total protein contents in the cytoplasm of ganglionic cells and photoreceptor cell nuclei indicate subsequent ultrasonic treatment to suppress or reduce the inhibitory effects of actinomycin given in small doses, although not the effects of large doses of the antibiotic. Preliminary ultrasound treatments, on the other hand, increase the metabolic resistivity of retinal cells to the damaging effects of actinomycin D, so that minimal cytochemical disorders are present following its administration. A.L.W.

**A82-31547 † The use of a phytochrome-dependent reaction to assess the influence of space flight factors on a plant organism (Ispol'zovanie fitokhromzavisimoi reaktsii pri otsenke vliianiia fakto-**

rov kosmicheskogo poleta na rastitel'nyi organizm). B. A. Shtsine, L. V. Nevzgodina, and A. T. Miller (Akademiia Nauk Latviiskoi SSR, Institut Biologii, Riga, Latvian SSR). *Akademiia Nauk Latviiskoi SSR, Izvestiia,* no. 11, 1981, p. 94-99. 16 refs. In Russian.

Experimental results are presented concerning the effect of space flight factors on lettuce seeds, tested on the Cosmos-936 and Cosmos-1129 satellites in the course of 20 days. The phytochrome-dependent reaction (PDR) of photosensitive seeds was used as the criterion to assess the biological effect of space flight factors. It is found that the PDR of dry seeds was inhibited after space flight, particularly if they were exposed to open space during flight. After flight, both the Phi-660 and Phi-730 dependent reactions were found to be inhibited. B.J.

**A82-31548** † **Rapid diagnostic systems - A principle for diagnostic preparations and an analysis of the rapid systems (Diagnosticheskie rapid-sistemy - Perspektivnyi printsip konstruirovaniia diagnosticheskikh preparatov i raschet rapid-system).** Iu. A. Ratiner (Moskovskii Nauchno-Issledovatel'skii Institut Vaktsin i Syvorotok, Moscow, USSR). *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii,* Jan. 1982, p. 22-26. 5 refs. In Russian.

With advances in microbiology, the number of microorganisms known to cause infectious diseases is increasing. This has led to an increase in the number of serums for diagnostic use. Diagnostic practice today uses polyvalent serums to determine the class of microorganisms and monovalent serums to make the final identification. With the rapid system, antibodies are distributed among polyvalent serums in such a way that monovalent serums become unnecessary. C.R.

**A82-31549** † **Change in the volume density of hypothalamic neurons during prolonged immobilization-nociceptive stress (Izmenenie ob'emnoi plotnosti neironov gipotalamusa krys pri dlitel'nom immobilizatsionno-bolevom stresse).** V. B. Pisarev (Volgogradskii Meditsinskii Institut, Volgograd, USSR). *Problemy Endokrinologii,* vol. 28, Mar.-Apr. 1982, p. 60-63. 8 refs. In Russian.

**A82-31597** † **Liquid-crystal state of nucleic acids in solution (Zhidkokristallicheskoe sostoianie nukleinovykh kislot v rastvore).** Iu. M. Evdokimov and Ia. M. Varshavskii (Akademiia Nauk SSSR, Institut Molekuliarnoi Biologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 5, 1982, p. 1254-1257. 15 refs. In Russian.

Experimental results are presented which indicate the existence of a mesophase state of DNA molecules in aqueous salt solutions of polyethylene glycol. The observed optical properties of this mesophase state can be interpreted in the light of two models of polymeric liquid crystals. According to one model, phase separation produces layers of parallelly arranged DNA molecules, each successive layer being turned at a certain angle with respect to the preceding layer; in this case, twisting occurs in the direction perpendicular to the long axes of the DNA molecules. According to the other model, the DNA molecules form columnar structures, and twisting occurs along the long axes of the DNA molecules. B.J.

**A82-31598** † **The role of methylation and Ca/2+/ in the photoaxis of Halobacterium halobium (Rol' metilirovaniia i Ca/2+/ v fototaksise Halobacterium halobium).** V. A. Baryshev and A. N. Glagolev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 5, 1982, p. 1261-1265. 15 refs. In Russian.

**A82-31599** † **The Na/+/-induced release of Ca/2+/ from the sarcoplasmic reticulum during the excitation of phasic muscle fibers (O Na/+/-indutsiruemom vysvobozhdenii Ca/2+/ iz sarkoplazmaticheskogo retikuluma pri vozbuzhdenii faznykh myshechnykh volokon).** V. P. Nesterov, Iu. N. Demina, and N. A. Maksimov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 263, no. 5, 1982, p. 1267-1270. 12 refs. In Russian.

[illegible] A.L.M.

A82-31537 [illegible]

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A82-31538 [illegible]

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# STAR ENTRIES

**N82-22867*#** Tufts Univ., Medford, Mass. Dept. of Physics.
**PROTEIN FOLDING, PROTEIN STRUCTURE AND THE ORIGIN OF LIFE: THEORETICAL METHODS AND SOLUTIONS OF DYNAMICAL PROBLEMS**
D. L. Weaver Mar. 1982 50 p refs
(NASA Order A-85784-B)
(NASA-CR-166318; NAS 1.26:166318) Avail: NTIS HC A03/MF A01 CSCL 06C

Theoretical methods and solutions of the dynamics of protein folding, protein aggregation, protein structure, and the origin of life are discussed. The elements of a dynamic model representing the initial stages of protein folding are presented. The calculation and experimental determination of the model parameters are discussed. The use of computer simulation for modeling protein folding is considered. B.W.

**N82-22868*#** National Aeronautics and Space Administration, Washington, D. C.
**THE EFFICIENCY COEFFICIENT OF THE RAT HEART AND MUSCULAR SYSTEM AFTER PHYSICAL TRAINING AND HYPOKINESIA**
Yu. S. Alyukhin and A. F. Davydov Apr. 1982 12 p refs Transl. into ENGLISH from Fiz. Zh. SSSR im I. M. Sechenova (USSR), v. 66, no. 11, 1980 p 1660-1665 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76843; NAS 1.15:76843) Avail: NTIS HC A02/MF A01

The efficiency of an isolated heart did not change after prolonged physical training of rats for an extreme load. The increase in oxygen consumption by the entire organism in 'uphill' running as compared to the resting level in the trained rats was 14% lower than in the control animals. Prolonged hypokinesia of the rats did not elicit a change in the efficiency of the isolated heart. S.L.

**N82-22869*#** National Aeronautics and Space Administration, Washington, D. C.
**INTRACELLULAR MECHANISM OF THE ACTION OF INHIBIN ON THE SECRETION OF FOLLICULAR STIMULATING HORMONE AND OF LUTEINIZING HORMONE INDUCED BY LH-RH IN VITRO**
M. J. Lecomte-Yerna, M. T. Hazee-Hagelstein, Ch. Charlet-Renard, and P. Franchimont Apr. 1982 8 p refs Transl. into ENGLISH from Compt. Rend. des Seances (France), v. 175, no. 3, 1981 p 385-388 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Societe de Biologie et de ses Filiales
(Contract NASw-3541)
(NASA-TM-76847; NAS 1.15:76847) Avail: NTIS HC A02/MF A01 CSCL 06C

The FSH secretion-inhibiting action of inhibin in vitro under basal conditions and also in the presence of LH-RH is suppressed by the addition of MIX, a phosphodiesterase inhibitor. In the presence of LH-RH, inhibin reduces significantly the intracellular level of cAMP in isolated pituitary cells. In contrast, the simultaneous addition of MIX and inhibin raises the cAMP level, and this stimulation is comparable to the increase observed when MIX is added alone. These observations suggest that one mode of action of inhibin could be mediated by a reduction in cAMP within the pituitary gonadotropic cell. Author

**N82-22870*#** National Aeronautics and Space Administration, Washington, D. C.
**BEHAVIORAL STUDY OF ULTRADIAN ACTIVITY PERIODS OF OF1 MICE ENCLOSED IN EXPERIMENTAL CAGES OF DIFFERENT DIMENSIONS**
A. Guillot Apr. 1982 13 p refs Transl. into ENGLISH from Comptes Rend. des Seances de la Soc. de Biol. et de ses Filiales (France), v. 175, no. 3, 1981 p 295-302 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. National de la Sante et de la Recherche Medicale, Paris
(Grant NASw-3541)
(NASA-TM-76848) Avail: NTIS HC A02/MF A01 CSCL 06C

Male mice are enclosed in cages of different dimensions (cage A - 23x8x8 cm., cage B - 38x27x17 cm.), in an alternating light/dark regimen, at an ambient temperature of 22 to 23 C. The successions of the behavioral sequences of ultradian activity periods are noticed by direct observation during 11 consecutive hours in light. The experimental situation modifies the mean duration time and the behavioral organization of each activity period. However, the comparison of the overall activity time lengths and the comparison of the overall behavioral frequencies suggest that the energy spent per mouse is constant. J.M.S.

**N82-22871#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**PRELIMINARY STUDY OF THE EFFECTS OF PROLONGED ACCELERATION ON SPINAL DYNAMICS OF BABOONS. 1: ACCELERATION. 2: BIOMECHANICAL ANALYSIS**
Arnold R. Slonim, Marvin E. Souder, James H. Vechte, John W. Frazier, Arnold R. Slonim, and Leon E. Kazarian Jun. 1981 60 p refs
(AD-A101768; AFAMRL-TR-80-40) Avail: NTIS HC A03/MF A01 CSCL 06C

Repetitive exposures to acceleration are studied to determine if they have an effect on spinal dynamics: if they cause bone strength variations of predisposition to spinal injuries. Two baboons were exposed simultaneously to 10 plateaus of +4 Gz/30 seconds each separated by intervals of +1.5 Gz/45 seconds at the rate of two times per week for 26 weeks. The results are to control noncentrifuged baboons. Subsequently, the spinal columns of these baboons were subjected to extensive mechanical strength testing. Each vertebra of the two baboons exposed to +Gz acceleration twice a week for 26 weeks was subjected to axial compressive loading at the rate of 88 sq to the minus third power meter/sec (21 in./min) on a material testing machine. The data, analyzed by PDP 11/34 computer, were compared with data obtained previously from four noncentrifuged baboons of the same age, weight and sex. S.L.

**N82-22872*#** National Aeronautics and Space Administration, Washington, D. C.
**CHANGE IN BLOOD GLUCOSE LEVEL IN RATS AFTER IMMOBILIZATION**
R. D. Platonov, G. M. Baskakova, and S. A. Chepurnov Dec. 1981 9 p refs Transl. into ENGLISH from Biol. Nauka (USSR), no. 9, 1975 p 37-40 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75997; NAS 1.15:75997) Avail: NTIS HC A02/MF A01 CSCL 06C

Experiments were carried out on male white rats divided into four groups. In group one the blood glucose level was determined immediately after immobilization. In the other three groups, two hours following immobilization, the blood glucose level was determined every 20 minutes for 3 hours 40 minutes by the glucose oxidase method. Preliminary immobilization for 2 hours removed the increase in the blood glucose caused by the stress reaction. By the 2nd hour of immobilization in the presence of continuing stress, the blood glucose level stabilized and varied within 42 + or - 5.5 and 47 + or - 8.1 mg %. Within 2 hours after the immobilization, the differences in the blood glucose level of the rats from the control groups were statistically insignificant. Author

**N82-22873#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 2.
**THE EFFECT OF PULSED MICROWAVES ON THE BREATHING OF MICE [INVERKAN AV PULSADE MIKROVAAGOR PAA ANDNING OCH KROPPSVIKT HOSS MOESS]**
C.-O. Cribom, C. I. Henriksson, and C.-J. Clemedson Apr. 1981 20 p refs In SWEDISH
(FOA-C-54032-H2, H3) Avail: NTIS HC A02/MF A01

With the use of a specially constructed microwave generator, mice were exposed to microwaves synchronized to the different stages of respiration. Frequencies other than the respiratory rate effect the volume and rate of respiration in shorter intervals of exposure. Even though the animals were not heated at the low average effect, approx. 1mW/sq cm during exposure, a change in body weight was measurable. These results indicate that the thermal energy balance in mice is somehow affected. J.M.S.

**N82-22874#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 2.

**THE ROLE OF BIOTECHNOLOGY IN THE DEVELOPMENT OF TECHNICAL SYSTEMS: A REFERENCE BACKGROUND**

Hans Furustig Jul. 1981 68 p refs In SWEDISH
(FOA-C-56026-H2) Avail: NTIS HC A04/MF A01

Modern civilization depends on the function of manned technical systems in which people spend most of their time. For scientific, ethical, and pragmatic reasons, it is important to study problems and experiences from system development. Systems analysis, ergonomics, human factors and frame of reference are discussed. Transl. by A.R.H.

**N82-22875*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**CERVIX-TO-RECTUM MEASURING DEVICE IN A RADIATION APPLICATOR FOR USE IN THE TREATMENT OF CERVICAL CANCER** Patent

David R. Fischell (Howard Univ.) and Jeffrey C. Mazique, inventors (to NASA) (Howard Univ.) Issued 13 Oct. 1981 5 p Filed 12 May 1977 Supersedes N77-26796 (15 - 17, p 2306) Continuation of abandoned US Patent Appl. SN-672209, filed 31 Mar. 1976 Sponsored by NASA
(NASA-Case-GSC-12081-2; US-Patent-4,294,264;
US-Patent-Appl-SN-796258; US-Patent-Appl-SN-672209;
US-Patent-Class-128-778; US-Patent-Class-128-1.2;
US-Patent-Class-33-143C) Avail: US Patent and Trademark Office CSCL 06B

A cervix-to-rectum measuring device to be used in the treatment of cervical cancer is described. It includes a handle and a probe pivotably connected to the handle for insertion in the rectum. The measuring device further includes means for coupling the handle to an intrauterine radiation applicator when the latter is positioned in the uterine cervix and the probe is inserted in the rectum to pivot the handle about the probe. A gear is provided which is adapted to pivot with the probe. A pinion pivotably connected to the handle meshes with the gear. A pointer fixed to the pinion is displaced in response to the pivoting of the handle about the probe, and this displacement can be read from a scale on the handle, providing an indication of the cervix-to-rectum distance.

Official Gazette of the U.S. Patent and Trademark Office

**N82-22876** Pennsylvania State Univ., University Park.

**HEAT-ACTIVATED SWEAT GLAND DENSITIES DETECTED THROUGH MACROPHOTOGRAPHY IN LEAN AND OBESE MEN EXPOSED TO A WARM, HUMID ENVIRONMENT** Ph.D. Thesis

James Alexander Bell 1981 172 p
Avail: Univ. Microfilms Order No. 8129140

Heat-activated sweat gland (HASG.cm-2) densities were quantified in lean and obese men to determine whether a significant inverse correlation between HASG and body surface area could be demonstrated. Heat exchange rates were also examined to determine if the heat exchange capacity of the obese is compromised due to fewer HASG. Twelve inactive men were divided into three equal groups. HASG were measured using a macrophotographic technique at four skin sites: forearm, chest, back, and thigh. Methacholine, a synthetic choline derivative biochemically similar to acetylcholine and synergistic to its action, was injected intradermally to ascertain maximal sweat gland activation. Other variables measured included skin and subcutaneous temperatures, rectal and esophageal core temperatures, heart rate, blood pressure, local and total body sweat rates, metabolic rate, and evaporation rate using an evaporimeter. HASG densities were not significantly different among the three groups. Dissert. Abstr.

**N82-22878#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**AERODYNAMIC FORCES EXPERIENCED DURING EJECTION**

Arthur J. Nestle Feb. 1981 12 p refs
(AF Proj. 7231)
(AFAMRL-TR-80-10) Avail: NTIS HC A02/MF A01

Emergency egress exposes aircrew members to abrupt accelerative and windblast forces. For the time period January 1967 to December 1977, 390 ejections were made from the F-4 aircraft. Forty-three aircrewmen sustained 95 long bone and joint injuries. Of this number, 39 were identified as upper and 22 as lower extremity injuries. The region, nature, and severity of long bone and joint injuries resulting from aircraft ejection are identified. Known biomedical data on bone and joint strength were reviewed. T.M.

**N82-22879#** Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.

**ANALYSIS OF VERTEBRAL STRESS DISTRIBUTIONS AND EJECTION-RELATED INJURY MECHANISMS** Final Technical Report, 1 Jul. 1977 - Jan. 1980

M. Plesha and T. Belytschko Wright-Patterson AFB, Ohio AFAMRL Feb. 1981 51 p refs
(Contract F33615-77-C-0526)
(AD-A098639; AFAMRL-TR-80-67) Avail: NTIS HC A04/MF A01

Stress analyses of lumbar vertebrae were performed by a three dimensional finite element method for the purposes of evaluating simplified models of the vertebrae which are suitable as injury postprocessors, and gaining a better understanding of injury mechanisms. The finite element analyses were linear and elastic. Axial and moment loads were applied over the end plates to simulate G(Z) impact and on the facets to simulate load transmission between the articular facets and the vertebral bodies. The finite element model predicts that the maximum stresses under axial load are perpendicular to the axis of the vertebral body, which are called axial stresses; this is consistent with the predominance of compressive and wedge fractures. However, the maximum stresses predicted by the finite element model are only about a third of those predicted by the simplified injury model. This discrepancy is due to the fact that a substantial portion of the total load is transmitted through the vertebral centrum which is neglected in the simplified model. S.L.

**N82-22880#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Environmental Medicine Div.

**EFFECTS OF WHOLE AND PARTIAL BODY EXPOSURE TO DRY HEAT ON CERTAIN PERFORMANCE MEASURES**

John F. Courtright May 1981 63 p refs
(AD-A100306; AFAMRL-TR-80-43) Avail: NTIS HC A04/MF A01

The effects on four performance measures of air of 65.6 C when the head was cooled with air of 15.6 C and without head cooling, were evaluated. Six subjects were exposed for 66 minutes to these environmental stressors and to two benign control tests. Humidity for all tests was maintained at 10 mm Hg partial water vapor pressure. The performance measures were mental arithmetic accuracy, choice reaction time, position compensation tracking, and rate compensation tracking. The tasks were presented in a repeating sequence throughout preexposure and exposure tests. Performance on all tasks showed the effects of the passage of time related to the gradual onset of fatigue. Preexposure reaction time performance and rate compensation tracking were better in the afternoon than in the morning. Performance on all tasks except position compensation tracking was influenced by differences in subject arousal level as indicated by body temperature measurements. The relationship between arousal level and reaction time stimulus information level was particularly pronounced. S.L.

**N82-22881#** National Mechanical Engineering Research Inst., Pretoria (South Africa). Special Projects Div.

**DEVELOPMENT OF THE CARBON FIBRE POLYSULPHONE TOGGLE FOR LIGAMENT REPAIR OPERATIONS**

M. S. Hunt May 1981 14 p ref
(CSIR-ME-1709; ISBN-0-7988-14784) Avail: NTIS HC A02/MF A01

The selection of a simple linked bar design, the toggle, for ligament repair operations was examined. The ligament repair operations are often carried out by using carbon fiber. The carbon fiber tows pass through a hole drilled in the bone so that they can be attached to the bone on its outer surface. The attachment can be done with a bollard and a number of successful operations have used this technique. A second hole is drilled adjacent to the hole through the bone but just deep enough for the insertion of the bollard and allows one or more tows to be attached in this way. In practice the carbon fiber tow used for the ligament is doubled over on itself once or twice to give increased strength. This creates a loop at one end of the ligament and allows a much simpler method of attachment based on the use of the one hole only. Possibilities are studied which explore the possibilities of retaining both simplicity and security. E.A.K.

**N82-22882#** Rolls-Royce Ltd., Derby (England).
**ANALYSIS OF SICKNESS RATES**
Dieter Schittek 1981 23 p refs Transl. into ENGLISH from Fortschrittliche Betriebsfuhrung u. Ind. Eng. (West Germany), v. 29, no. 5, 1980 p 247-252 In ENGLISH and GERMAN
(PNR-90097; Trans-15573/TLT-00819) HC A02/MF A01

The unexpectedly high absenteeism in West Germany during an economic recession is discussed. The literature indicates Work content, worker expectations, management methods, performance assessment techniques, and degree of personal responsibility affect psychosomatic illness rates. Psychological factors are suggested as the cause of increases in somatic illness, since physiological stresses show a downward trend. Sociological influences are also important; lower tolerance of frustration and growing sensitivity to working conditions increase the probability that illness will occur as an abreaction of the unconscious arousal complexes to which dissatisfaction can give rise. Managers who place the responsibility for industrial relations on medical and social welfare experts are criticized. Managers should ensure that tasks challenge individuals' knowledge, skill, and experience, and that workers are divided into groups whose members work well together. Author (ESA)

**N82-22883#** European Space Agency, Paris (France).
**MICROGRAVITY AS AN ADDITIONAL TOOL FOR RESEARCH IN HUMAN PHYSIOLOGY: SIMULATION ON GROUND; EXPOSURE TO WEIGHTLESSNESS; DEVELOPMENT OF MULTI-USER FACILITIES**
Flemming Bonde-Petersen (Copenhagen Univ.), Helmut Hinghofer-Szalkay (Graz Univ.), and Jerry Hordinsky (DFVLR, Cologne) Jan. 1982 55 p refs
(Contract ESA-81/86-075-HUPHYS)
(ESA-BR-09; ISSN-0250-1589) Avail: NTIS HC A04/MF A01; ESA, Paris FF 60 Member States, AU, CN and NO (+20% others)

Micro-g cardiovascular and pulmonary studies are summarized. A plan for coordinating European ground based micro-g simulation studies is presented. A multiuser facility for ground use which can be transformed into a space qualified facility is described. Difficulties in micro-g simulation include: the impossibility of equalizing hydrostatic pressure in the circulatory system; equalizing lung perfusion; recreating the subjective feeling of weightlessness; skin maceration in water; increased diuresis; and negative pressure breathing. Standardization of experiments is hindered by the interlaboratory variety of: measuring methods; simultaneous countermeasures; subjects; positioning, support, diet, and hydration of subjects; and temperature influences. A ground based model of Anthrorack, supplemented with a microcomputer and bus system interfaced with standard testing and measuring equipment, is suggested as a means of overcoming these problems. Author (ESA)

**N82-22884#** Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Flugzeuge.
**ANALYSIS OF PILOT INPUT CONCEPTS AND DEVICES INTO INTEGRATED DISPLAY/CONTROL SYSTEMS**
Ruediger Seifert 21 Apr. 1981 21 p refs Presented at 32nd AGARD Symp. on the Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design, Stuttgart, 5-8 May 1981
(MBB-FE-301/S/PUB/40) Avail: NTIS HC A02/MF A01

The concept of integrated display/control systems is addressed with emphasis on ergonomic requirements. Keyboard types, numeric input devices and positioning devices are discussed. Data handling concepts and layout criteria for fighter aircraft are also evaluated. J.M.S.

**N82-22885** Admiralty Marine Technology Establishment, Teddington (England).
**PERSONALISED TASK REPRESENTATION: DEVELOPMENTS**
R. Gregory Oct. 1981 21 p refs
(AMTE(E)-TM-81104; BR81584) Copyright. Avail: Issuing Activity

The logic underlying personalised task representation (PTR) and with the hermeneutical roots from which it grew are described. A central action node is encircled by when, why, how, and what next nodes. The what next node leads to the next action node. It is used for knowledge representation and the design of intelligent support systems. The logical relations of PTR are expressed in terms of a frame methodology as a step towards implementation of a PTR based system for the elicitation and representation of task knowledge. By anchoring subsequently elicited representations in task dependent primitives, the system potential for machine execution of the representations can be realized. Author (ESA)

**N82-22886*#** ACCORD, Los Altos, Calif.
**APPLICATION OF GUIDED INQUIRY SYSTEM TECHNIQUE (GIST) TO CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEMS (CELSS) Final Report**
Henry Aroeste Jan. 1982 23 p
(NASA Order A-827068B; NASA Order A-89697B)
(NASA-CR-166312; NAS 1.26:166312) Avail: NTIS HC A02/MF A01 CSCL 06K

Guided Inquiry System Technique, a global approach to problem solving, was applied to the subject of Controlled Ecological Life Support Systems (CELSS). Nutrition, food processing, and the use of higher plants in a CELSS were considered by a panel of experts. Specific ideas and recommendations gleaned from discussions with panel members are presented. Author

**N82-22887#** National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
**THE INVERSE DYNAMICS OF THREE-DIMENSIONAL HOMINOID MOTION**
H. Hatze Jun. 1981 37 p refs
(CSIR-SWISK-24; ISBN-0-7988-2127-2) Avail: NTIS HC A03/MF A01

Methods used for solving the inverse dynamics problem of three dimensional hominoid motion are described, and a user guide for the efficient implementation of the corresponding computer program is included. Kinetic and kinematic quantities used to solve the problem include: the internal joint torque vectors that generated the observed motion, the joint reaction force vectors, the linear and angular momentum vectors of the segments and the whole system, the mechanical energies of the segments and the whole system, the mechanical powers of the segments and the whole system, the position vector of the hominoid mass centroid, and the velocity vector of the hominoid mass centroid. S.L.

**N82-22888#** Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.
**STUDY OF PROTECTIVE MASK TYPE 33 [OEVERSYN AV SKYDDSMASK TYP 33]**
Roger Sundqvist Apr. 1981 25 p In SWEDISH
(FOA-C-40134-C2) Avail: NTIS HC A02/MF A01

A functional evaluation of protective mask type 33 was made. The mask did not comply with civilian standards because the measured CO2 concentration was too high and the exhalation resistance needed to be lowered. Both factors are considered important for user's comfort and could easily be improved. The facial rim was not flexible enough to conform to different facial shapes, wrinkles or beards. The mask design could be significantly improved by changing its shape; this would necessitate retooling the mold. Some simple modifications of the present tools which could improve the mask's performance are discussed. M.D.K.

**N82-22889#** Research Inst. of National Defence, Stockholm (Sweden).
**RECOGNITION OF VEHICLE TARGETS FROM THE AIR: A FIELD TEST [IDENTIFIERING AV FORDONSMAAL FRAAN LUFTEN ETT FAELTFOERSOEK]**
Bjoern Nordin Nov. 1981 25 p refs In SWEDISH
(FOA-C-56027-H2) Avail: NTIS HC A02/MF A01

The distances at which a previously detected vehicle target can be identified was determined. The flight height was 100 m and the speed of the aircraft 190 Km/hr. Six persons without any experience in reconaissance identified five vehicles with a virtually constant accuracy of 70% regardless of the distance. The length of the checked interval was 1 to 4.5 Km, but most of the answers were given at 2.5 Km from the target. Other factors than distance influence on identification performance, indicating that the test persons used other decision making criteria. Author (ESA)

**N82-23108*#** Texas Southern Univ., Houston. Medical Research Branch.

**EXPERIMENTAL STUDY OF HIGH DENSITY FOODS FOR THE SPACE OPERATIONS CENTER Final Report**

Selina M. Ahmed *In* Houston Univ. The 1981 NASA ASEE Summer Fac. Fellowship Program, Vol. 1 20 Aug. 1981 22 p refs

Avail: NTIS HC A14/MF A01 CSCL 06H

The experimental study of high density foods for the Space Operations Center is described. A sensory evaluation of the high density foods was conducted first to test the acceptability of the products. A shelf-life study of the high density foods was also conducted for three different time lengths at three different temperatures. The nutritional analysis of the high density foods is at present incomplete. M.D.K.

**N82-23110*#** Kentucky State Univ., Frankfort. Dept. of Biology.

**CARDIOVASCULAR ADAPTATIONS IN WEIGHTLESSNESS: THE INFLUENCE OF IN-FLIGHT EXERCISE PROGRAMS ON THE CARDIOVASCULAR ADJUSTMENTS DURING WEIGHTLESSNESS AND UPON RETURNING TO EARTH**

Charles H. Bennett *In* Houston Univ. The 1981 NASA ASEE Summer Fac. Fellowship Program, Vol. 1 20 Aug. 1981 37 p refs

Avail: NTIS HC A14/MF A01 CSCL 06S

The effect of in-flight exercise programs on astronauts' cardiovascular adjustments during spaceflight weightlessness and upon return to Earth was studied. Physiological changes in muscle strength and volume, cardiovascular responses during the application of lower body negative pressure, and metabolic activities during pre-flight and flight tests were made on Skylab crewmembers. The successful completion of the Skylab missions showed that man can perform submaximal and maximal aerobic exercise in the weightless enviroment without detrimental trends in any of the physiologic data. Exercise tolerance during flight was unaffected. It was only after return to Earth that a tolerance decrement was noted. The rapid postflight recovery of orthostatic and exercise tolerance following two of the three Skylab missions appeared to be directly related to total in-flight exercise as well as to the graded, regular program of exercise performed during the postflight debriefing period. M.D.K.

**N82-23115*#** Houston Univ., Tex.

**ANTHROPOMETRIC DATA ERROR DETECTING AND CORRECTION WITH A COMPUTER**

David D. Chesak (St. Joseph's College) *In its* The 1981 NASA ASEE Summer Fac. Fellowship Program, Vol. 1 20 Aug. 1981 12 p refs

Avail: NTIS HC A14/MF A01 CSCL 05H

Data obtained with automated anthropometric data equisition equipment was examined for short term errors. The least squares curve fitting technique was used to ascertain which data values were erroneous and to replace them, if possible, with corrected values. Errors were due to random reflections of light, masking of the light rays, and other types of optical and electrical interference. It was found that the signals were impossible to eliminate from the initial data produced by the television cameras, and that this was primarily a software problem requiring a digital computer to refine the data off line. The specific data of interest was related to the arm reach envelope of a human being. M.D.K.

**N82-23124*#** Houston Univ., Tex.

**ANTHROPOMETRIC PROGRAM ANALYSIS OF REACH AND BODY MOVEMENT Final Report**

Charles J. McKinley *In its* The 1981 NASA ASEE Summer Fac. Fellowship Program, Vol. 2 20 Aug. 1981 18 p refs

Avail: NTIS HC A17/MF A01 CSCL 05H

A multifaceted project involving tasks related to anthropometric data collection and comparison is discussed. Activities relating to human force and motion capabilities and information on astronaut candidates doing certain force and motion activites were studied. The subjects were suited, both in one-G and in neutral buoyancy of a water facility, and also unsuited, in a one-G environment. Pieces of hardware used in quantification of the data collection were reviewed. The hardware included a CYBEX 2 force and torque machine, and a three dimension camera system (AMS) for measuring range of motion envelopes. Collecting techniques are compared and standardization of data collection is suggested. E.A.K.

**N82-23134*#** Virginia Univ., Charlottesville.

**OPTIMAL USE OF ELECTROPHYSIOLOGICAL INDICATORS OF MUSCULAR EFFORT AND FATIGUE Final Report**

Otis L. Updike *In* Houston Univ. The 1981 NASA ASEE Summer Fac. Fellowship Program, Vol. 2 20 Aug. 1981 15 p refs

Avail: NTIS HC A17/MF A01 CSCL 06S

Electromyograms (EMG) from working muscles convey information on effort and fatigue. Their application, e.g., to assess the demands of vehicle control tasks, is complicated by the cooperative action of sets of muscles, by both intrinsic and imposed filtering, and by numerous other sources of variation. Fourier analyses of these noise like signals offer one approach to interpretation; downward spectral shifts accompany fatigue. Techniques are being sought (in both time and frequency domains) for further condensing the wideband EMG signals, while retaining essential information, into a concise 'state vector' usable in comparing control system designs. S.L.

**N82-23971#** Washington Univ., Seattle. Dept. of Genetics.

**NUMERICAL METHODS FOR INFERRING EVOLUTIONARY TREES**

Joseph Felsenstein Sep. 1981 42 p refs
(Contracts DE-AM06-76RL-02225; DE-AT06-76EV-71005)
(DE82-002295; DOE/EV-71005/81) Avail: NTIS HC A03/MF A01

For discrete characters whose ancestral states are known, the prescriptions of Hennig are well-defined, but their applicability only when there is no incompatibility between different characters has led to the elaboration of a number of methods for dealing with incompatibilities. One category is the parsimony methods, which choose that phylogeny on which the fewest changes of character state need be assumed. Another is the compatibility methods, which choose that phylogeny which is perfectly compatible with the largest number of characters, irrespective of how many changes need be assumed in other characters. Other approaches include the use of phenetic clustering algorithms and methods fitting trees to similarity or distance matrices. Each method has different implicit assumptions concerning the biology of the characters and the information available in the data. The biological assumptions and statistical behavior of each method are discussed. T.M.

**N82-23972#** Clemson Univ., S.C.

**A STATISTICAL MODEL OF THE CONTROLLER FUNCTIONS OF THE HUMAN TEMPERATURE REGULATING SYSTEM Ph.D. Thesis**

Jeffrey Leo Ringuest 1981 128 p

Avail: Univ. Microfilms Order No. 8126923

A model of the controller mechanisms of the human temperature regulating system was developed. In this context, three different controller responses were examined including: increases in metabolic heat production, increases in evaporative heat loss and modifications in surface blood flow. Additionally, upper and lower limits for each of these controller functions were researched. The relationship between the environmental temperature and the controller model form and parameters was investigated. Finally, it was necessary to statistically test the validity of the controller model that was developed. Data was analyzed using a least squares approach. This procedure involved fitting an equation to a controller response for a limited temperature range. A model of human responses to temperature stress in an air environment and in a water environment was developed which proved to be valid for a wide range of experimental conditions. Dissert. Abstr.

**N82-23973#** Mississippi Univ., University.

**THE EFFECTS OF VARYING EXERCISE INTENSITIES AND DURATIONS ON PLASMA HIGH DENSITY LIPOPROTEIN-CHOLESTEROL, BODY COMPOSITION AND MAXIMUM OXYGEN CONSUMPTION Ph.D. Thesis**

Thomas John Birk 1981 169 p

Avail: Univ. Microfilms Order No. 8128089

Forty-three sedentary men twenty-three to thirty-eight years of age after being randomly assigned to either one of four experimental treatment groups or an inactive control group completed a fifteen week, three day per week experimental exercise training period. Results indicated that high density lipoprotein-cholesterol was increased during a seven and one-half to fifteen weeks, three days per week, exercise program of moderate intensity and lower to moderate duration. Percent body fat was decreased most effectively by a higher intensity of workload. A higher intensity and longer duration (80 percent of the difference for thirty minutes) was more effective than other exercise intensities and durations for significantly increasing maximum oxygen consumption. There was also a significant inverse relationship between maximum oxygen consumption and percent body fat at seven and one-half and fifteen weeks of three days per week jogging exercise. Dissert. Abstr.

**N82-23975#** Medical Biological Lab. RVO-TNO, The Hague (Netherlands).

**DISTURBANCES IN THE CARBOHYDRATE METABOLISM IN SHOCK. 3: EXPERIMENTAL HEMORRHAGIC SHOCK AND SOME SHOCK MODELS. REVIEW OF THE LITERATURE**

C. vanderMeer Jun. 1980 81 p In DUTCH; ENGLISH summary
(MBL-1980-10; TDCK-71318) Avail: NTIS HC A05/MF A01

Literature concerning disturbances in the carbohydrate metabolism in experimental hemorrhagic shock, traumatic shock, burns and cardiac shock is reviewed. General observations are a hyperglycemia especially in the early stages of shock (presumably caused by an increased release of catecholamines), sometimes followed in later stages by glycogen depletion in the liver and hypoglycemia. In addition an increased level of plasma lactate and pyruvate, acidosis and a decrease in energy rich phosphates in a number of organs are found. Except for the assumption that these changes may be caused by hypoxia in the liver and other organs, as yet nothing is known with certainty about the origin and nature of the disturbances in the carbohydrate metabolism. Therapeutic effects a.o glucose, glucose-insulin-KC1, glucocorticoids, ATP-MgCl2, naloxone, neuroleptics and neuroleptanalgesia and the adrenergic blocking agents WR-149, 024 and WR-2823 are described. S.L.

**N82-23976*#** Thermo Electron Corp., Waltham, Mass.

**EVALUATION OF LEFT VENTRICULAR ASSIST DEVICE PUMP BLADDERS CAST FROM ION-SPUTTERED POLYTETRAFLUORETHYLENE MANDRELS**

Mar. 1982 103 p refs
(Contract NAS3-22476)
(NASA-CR-167904; NAS 1.26:167904; TE200-230-82) Avail: NTIS HC A06/MF A01 CSCL 06B

A highly thromboresistant blood contacting interface for use in implanatable blood pump is investigated. Biomaterials mechanics, dynamics, durability, surface morphology, and chemistry are among the critical consideration pertinent to the choice of an appropriate blood pump bladder material. The use of transfer cast biopolymers from ion beam textured surfaces is investigated to detect subtle variations in blood pump surface morphology using Biomer as the biomaterial of choice. The efficacy of ion beam sputtering as an acceptable method of fabricating textured blood interfaces is evaluated. Aortic grafts and left ventricular assist devices were implanted in claves; the blood interfaces were fabricated by transfer casting methods from ion beam textured polytetrafluorethylene mandrels. The mandrels were textured by superimposing a 15 micron screen mesh; ion sputtering conditions were 300 volts beam energy, 40 to 50 mA beam, and a mandrel to source distance of 25 microns. S.L.

**N82-23977#** Royal Naval Personnel Research Committee, London (England).

**[MEDICAL RESEARCH OF NAVAL PERSONNEL] Progress Report, Jan. 1979 - Jul. 1981**

Jul. 1981 15 p refs
(RNP-3/81; BR82205) Copyright. HC A02/MF A01

Research into biological, medical, physiological and psychological problems affecting the health and fighting efficiency of naval personnel is summarized. No safe and simple test of the physical fitness of an individual on a single occasion was found. The cognitive efficiency of divers is impaired during prolonged dives at depths > 300 m. No long-term adverse effects result from breathing air with C02 level = 0.5%. For C0, 15 ppm in air is safe. Afterdrop in deep body temperature, following cold water immersion can be accounted for by a physical mechanism; postimmersion death is attributed to vasomotor collapse. Maximum noise exposure levels recommended for divers working near sonar sources are 175 db for nonhooded and 185 db for hooded divers. Motion sickness affects 75% of sailors during their service life. When a 25 man liferaft is closed down, toxic levels of C02 are reached within 25 min. Author (ESA)

**N82-23978#** Kentucky Univ., Lexington. Biomedical Engineering Lab.

**RESPONSE OF THE CARDIOVASCULAR SYSTEM TO VIBRATION AND COMBINED STRESSES Progress Report, 1 Oct. 1980 - 30 Sep. 1981**

Charles F. Knapp, Joyce M. Evans, and David C. Randall Nov. 1981 66 p refs
(Grant AF-AFOSR-0039-80; AF Proj. 2312)
(AD-A110494; AFOSR-82-0019TR) Avail: NTIS HC A04/MF A01 CSCL 06/19

The research effort of the past year was divided into three phases, each of which adds to our systematic investigation of the frequency response characteristics of cardiovascular regulation. The frequency response characteristics are obtained from the analysis of pressure, flow and heart volume responses to low frequency, sinusoidal acceleration (0.001 to 0.25 Hz + or - 2gz). The 3 phases are: (1) Heart volume measurements in unblocked and autonomically blocked, normal and cardiac denervated dogs undergoing low frequency +2g sinusoidal acceleration; (2) Comparison of autonomic effector blockade with ganglionic blockade; and (3) The effect of cardiac denervation on cardiovascular function before and after autonomic effecter blockade. GRA

**N82-23979#** London Univ. (England). School of Hygiene and Tropical Medicine.

**HEALTH HAZARDS OF VISUAL DISPLAY UNITS WITH PARTICULAR REFERENCE TO OFFICE ENVIRONMENTS**

Rachel Birnbaum 1981 13 p refs
(PB82-120627) Avail: NTIS HC A02/MF A01 CSCL 06J

The interaction of man and the visual display unit (VDU) takes place during major tasks, which may make up the greater part of the job of the worker. The occupational health effects of VDUs derive primarily from the effects of long exposure of the worker to the light, reflection, glare and flickering of the CRT screen. The majority of problems therefore tend to be perceptual and the precipitating causes tend to be multiple and interactive. These and other ergonomic problems of the VDU operator are summarized. T.M.

**N82-23980#** Dayton Univ., Ohio. Research Inst.

**CONDUCTING STUDIES OF TRANSFER OF LEARNING: A PRACTICAL GUIDE Final Report**

Thomas A. Payne Brooks AFB, Tex. AFHRL Jan. 1982 32 p refs
(Contract F33615-77-C-0054; AF Proj. 1123)
(AD-A110569; AFHRL-TR-81-25) Avail: NTIS HC A03/MF A01 CSCL 05/9

This is a guide for use by the practical researcher concerned with conducting studies of transfer from pretraining of pilots in ground-based environments to performance in aircraft. While the material addresses principally transfer of learning of pilots, many of the issues should be applicable to other contexts, to include training of other aircrew members or even individuals who have quite different tasks to perform. The paper does not deal with theory but, rather, is concerned entirely with method of the transfer study. Method issues, to include the planning, tasks students, performance measurement, instructors, and analyses, are central to arriving at precise estimates of transfer effects--approaching as closely as possible the maximum that might have been demonstrated, providing a goal for the operational instructor pilot. Study models discussed include those for percent transfer of learning and the for transfer effectiveness ratio. Use of the latter should be essential in providing answers to contemporary questions concerning how much simulator pretraining can be used to replace aircraft training time--without reducing the goodness of the end product, the combat effective pilot. Author (GRA)

**N82-23981#** Minnesota Univ., Minneapolis. Dept. of Psychology.

**DIMENSIONALITY OF MEASURED ACHIEVEMENT OVER TIME**
Kathleen A. Gialluca and David J. Weiss Dec. 1981 45 p refs
(Contract N00014-79-C-0172; RR0420401; NR Proj. 150-433)
(AD-A110955; RR-81-5) Avail: NTIS HC A03/MF A01 CSCL 05/10

Some type of difference or change score is frequently used to quantify the effects of experimental treatments and educational programs on individuals and on groups of individuals. Whether the change measurement involves the use of simple difference scores, their derivatives, or some more complex methodological design, the measurement process itself assumes that the treatment or instruction results in higher levels of the originally measured variable and that the only change that occurs is a quantitative one. If this assumption is not met, then the computation of any type of difference score is inappropriate and the scores themselves are useless for measuring growth or change. Two studies investigated the tenability of the assumption that classroom instruction results in increases in students' achievement levels while the qualitative nature of that achievement remains constant across time. The data utilized were the item responses to tests in basic mathematics and in general biology administered as pretests and after instruction to students enrolled in those courses. Results included that this assumption was not tenable in the biology data set, where increases in mean achievement level were accompanied by corresponding changes in the factor structure underlying the item responses. For the mathematics data, however, there was no such violation of the assumption: As student achievement levels increased the underlying factor structure remained unchanged. The implications of these results for psychology, education, and program evaluation are noted. Author (GRA)

**N82-23982*#** Metrics, Inc., Atlanta, Ga.
**CELSS SCENARIO ANALYSIS: BREAKEVEN CALCULATIONS Final Report**
Robert M. Mason Apr. 1980 42 p refs
(NASA Order A-70035B)
(NASA-CR-166319; NAS 1.26:166319) Avail: NTIS HC A03/MF A01 CSCL 06H

A model of the relative mass requirements of food production components in a controlled ecological life support system (CELSS) based on regenerative concepts is described. Included are a discussion of model scope, structure, and example calculations. Computer programs for cultivar and breakeven calculations are also included. B.W.

**N82-23983*#** Texas Univ., Austin. Dept. of Zoology.
**LITERATURE REVIEW OF HUMAN MICROBES' INTERACTION WITH PLANTS**
Bassett Maguire, Jr. Aug. 1980 217 p refs
(NASA Order A-77042)
(NASA-CR-166330; NAS 1.26:166330) Avail: NTIS HC A10/MF A01 CSCL 06C

Human carried microorganisms, which cannot practically be excluded from human supporting agricultural systems of extra terrestrial stations, are considered. These microorganisms damage the plants on which the people depend for oxygen and food. The inclusion of carefully screened or constructed, but more or less normal, phylloplane and rhizosphere microbial communities is studied. S.L.

**N82-23984*#** New Hampshire Univ., Durham. Complex Systems Research Center.
**AN APPROACH TO THE MATHEMATICAL MODELLING OF A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM**
Maurice M. Averner Aug. 1981 78 p refs
(Contract NAS2-10133)
(NASA-CR-166331; NAS 1.26:166331) Avail: NTIS HC A05/MF A01 CSCL 06H

An approach to the design of a computer based model of a closed ecological life-support system suitable for use in extraterrestrial habitats is presented. The model is based on elemental mass balance and contains representations of the metabolic activities of biological components. The model can be used as a tool in evaluating preliminary designs for closed regenerative life support systems and as a method for predicting the behavior of such systems. T.M.

**N82-23985*#** Purdue Univ., Lafayette, Ind. Dept. of Horticulture.
**NUTRITIONAL AND CULTURAL ASPECTS OF PLANT SPECIES SELECTION FOR A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM**
J. E. Hoff, J. M. Howe, and C. A. Mitchell Mar. 1982 129 p refs
(Grants NsG-2401; NsG-2404)
(NASA-CR-166324; NAS 1.26:166324) Avail: NTIS HC A07/MF A01 CSCL 06H

The feasibility of using higher plants in a controlled ecological life support system is discussed. Aspects of this system considered important in the use of higher plants include: limited energy, space, and mass, and problems relating to cultivation and management of plants, food processing, the psychological impact of vegetarian diets, and plant propagation. A total of 115 higher plant species are compared based on 21 selection criteria. B.W.

**N82-23986#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**SAFE WEARING TIMES FOR IMPERMEABLE CHEMICAL PROTECTIVE CLOTHING**
W. A. Lotens [1982] 15 p refs In DUTCH; ENGLISH summary
(IZF-1980-11; TDCK-75010) Avail: NTIS HC A02/MF A01

Computer assisted calculations were made to predict the course of the rectal temperature and heat storage of a working man, wearing impermeable protective garments. The calculations were based on the Givoni-Goldman system as well as on a developed heat exchange model. The results are different and the latter model seems to have a slight preference. Safety limits are given in terms of work-rest ratios for long wearing times and in terms of tolerance times for continuous work and for various values of climate and work. Author

**N82-23987*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PROJECT OASIS: THE DESIGN OF A SIGNAL DETECTOR FOR THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE Final Report**
Steven Lord, ed. (Massachusetts Univ.), Robert Dixon, ed. (Ohio State Univ.), and Timothy Healy, ed. (Santa Clara Univ.) 1981 445 p refs
(Grant NGT-05-017-998)
(NASA-TM-84738; NAS 1.15:84738) Avail: NTIS HC A19/MF A01 CSCL 03C

An 8 million channel spectrum analyzer (MCSA) was designed the meet to meet the needs of a SETI program. The MCSA puts out a very large data base at very high rates. The development of a device which follows the MCSA, is presented. S.L.

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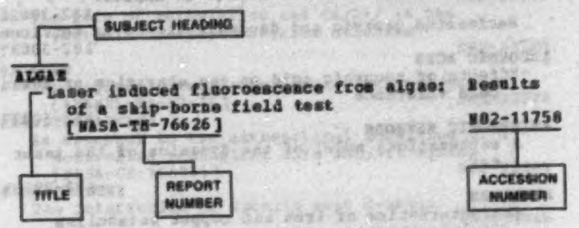

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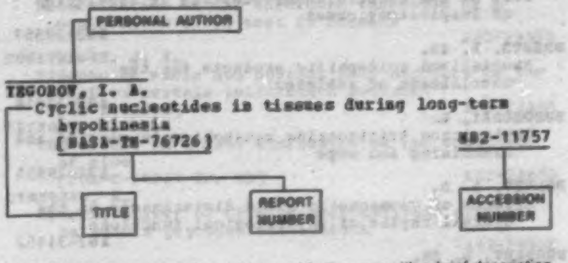

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NASA SP-7011(236)

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 236)

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in August 1982 in**

- *Scientific and Technical Aerospace Reports (STAR)*
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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 207 reports, articles and other documents announced during August 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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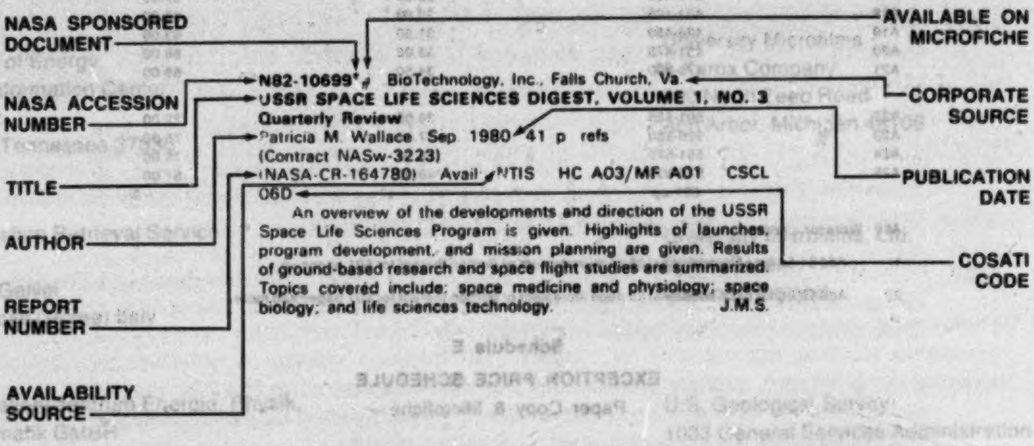

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An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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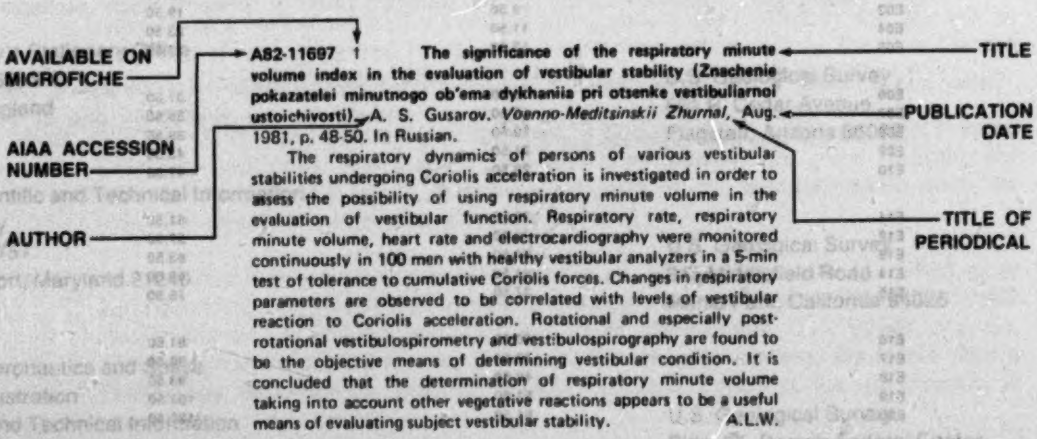

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**A82-11697 #** **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

## A Continuing Bibliography (Suppl. 236)

SEPTEMBER 1982

## IAA ENTRIES

**A82-31830** **The effects of social isolation on human functioning (Wplyw izolacji spolecznej na funkcjonowanie czlowieka).** J. Terelak and K. Kwarecki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki,* vol. 14, no. 1-2, 1981, p. 57-68. 21 refs. In Polish.

Studies relating to the effects of social isolation on the psychological, physiological and psychophysiological functioning of man are reviewed in light of the importance of such studies for space psychology. The relation between social isolation and sensory deprivation is discussed, and the importance of sensory stimulation to human functioning is pointed out. Problems arising from social isolation in polar stations are then examined, and means for improving adaptation to isolation are considered. Finally, empirical data and the concept of individual temperament are used to develop a mechanism for the effects of social isolation. A.L.W.

**A82-31831** **Central nervous system reactivity in the image of the visual evoked potential and the perceptual-motor performance of pilots and cosmonaut candidates under conditions of sleep deprivation (Reaktywnosc osrodkowego ukladu nerwowego w obrazie wzrokowego potencjalu wywolanego wpw a sprawnosc percepcyjno-motoryczna pilotow i kandydatow na kosmonautow w warunkach deprywacji snu).** W. Zuzewicz and J. Maciejczyk (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki,* vol. 14, no. 1-2, 1981, p. 69-85. 28 refs. In Polish.

The effects of sleep deprivation on the visual evoked potential and psychomotor and perceptual performance are studied in pilots deprived of sleep for 52 hours. Electroencephalograph recordings show sleep deprivation to be accompanied by increase in the amplitude of the components of the evoked potential, as well as increases in latency time and in the duration of the late components. Sleep deprivation is also found to decrease visual-motor coordination, although it improves short-term attention. A correlation is found between visual evoked potential parameters on the one hand and visual-motor coordination and attention on the other under conditions of rest, however after sleep deprivation the dependence only involves attention. A.L.W.

**A82-31832** **Hemodynamic response during combined tilt table-isometric exercise test and +Gz acceleration tolerance.** W. Kowalski (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki,* vol. 14, no. 1-2, 1981, p. 87-95. 11 refs.

The use of isometric exercises in combination with the tilt-table test as a predictor of human acceleration tolerances is investigated. Threshold acceleration tolerances were determined on a human centrifuge for 20 healthy pilots aged 21-23 years, and compared with measurements of heart rate and blood pressure performed during a tilt-table test in which subjects performed 50% maximal force static hand-grip exercise in the last 2 min of the 10 min rest period in the horizontal position prior to tilting. Pre-tilt heart rates are found to be lower and blood pressures higher in those subjects showing an above-average acceleration tolerance than in those with below-average tolerance. Isometric exercise during the tilt-table test evokes significant hemodynamic responses, including increases in heart rate, blood pressure and the pressure-time index, which are significantly more pronounced in subjects with lower acceleration tolerances. A.L.W.

**A82-31837** **Problems of human biology in Polish polar research.** K. Kwarecki and J. Terelak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki,* vol. 14, no. 3, 1981, p. 35-49. 13 refs.

Various aspects of the biomedical part of the Polish polar research program are reviewed. Attention is given to selected physiological functions of human beings in regard to location and duration of stay in polar conditions; basic human biorhythms; psychosocial phenomena during isolation, health standards and criteria for the recruitment of candidates; and rules of prophylactic and medical treatment. B.J.

**A82-32001** **An analysis of the risk of human cardiac damage during +Gz stress - A review.** M. H. Laughlin (Oral Roberts University, Tulsa, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, May 1982, p. 423-431. 96 refs.

Minor cardiac damage represented by subendocardial hemorrhage, myofibrillar degeneration and myocardial necrosis has been observed in miniature swine following acute +Gz exposure. The present paper reviews the available information on the pathogenesis, cumulative nature and clinical manifestations of such effects in order to evaluate the risk of such cardiac pathology in humans. The evidence is shown to suggest that the G-related hemorrhage is connected with sympathetic nervous and hormonal catecholamine effects on the heart, and the cardiomyopathy is not indicative of an ischemic or hypoxic pathogenesis. Chronic exposure studies indicate that the G-related cardiopathies may be more related to psychic than to acceleration stresses. Finally, the large amount of clinical cardiologic and histopathological data acquired for humans exposed to various levels of +Gz stress for about 40 years fails to indicate any cardiac damage as a result of +Gz exposure. It is thus concluded that +Gz exposure poses no significant risk for cardiac damage in humans. A.L.W.

**A82-32002** **Acceleration-induced atrioventricular dissociation - Hemodynamic consequences.** J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space and Environmental Medicine,* vol. 53, May 1982, p. 432-434. 13 refs.

At rest, compensatory mechanisms are able to make up for the loss of a properly timed atrial systole. At maximal stress or in a severely compromised patient, however, proper atrial function may be crucial for maintaining optimum cardiac output. A case of an apparently healthy male subject who developed A-V dissociation during +Gz stress and subsequently could not maintain vision at the higher (+7 Gz) levels is reported. Anatomic, geometric, and physiologic considerations suggest that the loss of atrial function is probably associated with the loss of roughly 30 torr in arterial pressure during high +Gz stress. Since the subject was an avid jogger, the etiology of the A-V dissociation was considered to be due to physiologically enhanced vagal tone. This case, therefore, suggests that special attention should be given to the physical fitness programs designed for individuals in a unique profession, such as piloting single-seat high-performance fighter aircraft. (Author)

**A82-32003** **Human tracking performance changes during combined +Gz and + or - Gy stress.** J. W. Frazier, D. W. Repperger, D. N. Toth, and V. D. Skowronski (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *Aviation, Space* *and Environmental Medicine,* vol. 53, May 1982, p. 435-439. 9 refs.

An experiment has been conducted on the centrifuge to examine roll-axis tracking performance in both static and stress environments. The stress environments were +5 Gz for 95 sec and combined +5 Gz/+ or - 1 or + or - 2 Gy for 95 sec. Compared to the static condition, performance decrements of 19% were measured at +5 Gz, 45% at combined +5 Gz/+ or - 1 Gy, and 70% at combined +5 Gz/+ or - 2 Gy. Heart rate increases were noted during the stress environments but no significant heart rate differences were noted between the +5 Gz and the combined +5 Gz/+ or - 2 Gy conditions. The conventional lap belt and shoulder harness restraint system, while not optimum, was adequate for these G environments. (Author)

**A82-32004** **Mechanism of vertebral fracture in the F/FB-111 ejection experience.** B. F. Hearon, H. A. Thomas, and J. H. Raddin, Jr. (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *Aviation, Space and Environmental Medicine,* vol. 53, May 1982, p. 440-448. 29 refs.

A review of the accident investigation reports of all non-fatal F/FB-111 ejections which occurred from 19 October 1967 to 26 March 1980 was conducted. The available spinal radiographs of the ejectees were also reviewed. The overall rate of vertebral compression fractures among the survived ejectees in a properly functioning module is 29.5% (23 of 78). The general mechanism of vertebral injury is a combined mechanism involving both axial compression and flexion. There is no evidence to indicate a hyperextension injury mechanism during retraction, nor is there evidence to support the presumed efficacy of the crossed-arms bracing procedure recommended for landing impact in modifying the vertebral injury rate. It appears that a significant reduction in the rate of vertebral fractures among F/FB-111 ejectees will require decreasing the acceleration stresses imposed on the crewmembers during landing impact. (Author)

**A82-32005 *** **Reducing motion sickness - A comparison of autogenic-feedback training and an alternative cognitive task.** W. B. Toscano (California, University, San Francisco, CA) and P. S. Cowings (NASA, Ames Research Center, Moffett Field, CA). *Aviation, Space and Environmental Medicine,* vol. 53, May 1982, p. 449-453. 11 refs. Grant No. NCA2-OR-665-810.

Eighteen men were randomly assigned to three groups matched for susceptibility to Coriolis motion sickness. All subjects were given six Coriolis Sickness Susceptibility Index (CSSI) tests separated by 5-d intervals. Treatment Group I subjects were taught to control their own autonomic responses before the third, fourth, and fifth CSSI tests (6 h total training). Group II subjects were given 'sham' training in an alternative cognitive task under conditions otherwise identical to those of Group I. Group III subjects received no treatment. Results showed that Group I subjects could withstand the stress of Coriolis acceleration significantly longer after training. Neither of the other two groups changed significantly. (Author)

**A82-32006** **Discomfort judgments of translational and angular whole-body vibrations.** R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *Aviation, Space, and Environmental Medicine,* vol. 53, May 1982, p. 454-457. 6 refs. Contract No. F33615-79-C-0509.

In a previous series of experiments (Shoenberger, 1980) the subjective intensities of translational (Z-axis) and angular (roll, pitch, and yaw) vibrations were compared, using a psychophysical matching technique. To test the validity and generality of the matching results, an independent set of similar data was obtained in the present experiment, using the method of category production. Seated subjects set levels of translational vibrations, in the X-, Y-, and Z-axes, and angular vibrations, in roll and pitch, that they judged to be 'uncomfortable' on a scale of vibration discomfort. Frequencies of 2.5, 3.15, 4.0, 5.0, 6.3, and 8.0 Hz were presented in each vibration direction. As frequency increased the mean acceleration judged to be uncomfortable increased for Y-axis and roll vibrations, decreased for Z-axis vibrations, and was essentially constant for X-axis and pitch vibrations. The Y- and Z-axis results correspond well to equal intensity contours in existing vibration exposure criteria, and the roll results show good agreement with data from the roll matching experiment. The X-axis and pitch results are similar to the results from the pitch matching experiment and indicate the importance of the backrest in determining the effects of X-axis translational vibrations and angular vibrations in pitch. (Author)

**A82-32008** **Effect of different runway sizes on pilot performance during simulated night landing approaches.** H. W. Mertens and M. F. Lewis (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, May 1982, p. 463-471. 26 refs.

Visual illusions have been implicated as causal factors in a large number of aircraft accidents during night visual landing approaches. The present study was conducted to quantify the illusions produced by runways of unfamiliar lengths and widths in simulated night approaches. An aircraft simulator with a computer-generated visual display of the runway in a nighttime black hole situation scene was used to measure pilot performance during approaches to runways of constant length but widths varying from 75 to 300 ft following practice at a fixed runway width, and approaches to runways of length varying from 3000 to 9000 ft and widths varying from 100 to 300 ft. Training on a wide runway is found to lower approach angle in approaches to narrow runways, while a narrow practice runway raised approach angles to wider runways; the magnitude of these effects increased as distance from runway threshold decreased. Approach angle in general is observed to decrease as runway width decreased and as length increased. Prior information about runway size had no effect on the responses. A.L.W.

**A82-32009** **Women at altitude - Cardiovascular responses to hypoxia.** B. L. Drinkwater, P. O. Kramar, J. F. Bedi, and L. J. Folinsbee (Washington, University, Seattle, WA). *Aviation, Space and Environmental Medicine,* vol. 53, May 1982, p. 472-477. 30 refs. Research supported by the National Geographic Society.

Six women mountaineers, 23-43 years of age, participated in a series of physiological tests prior to and during an expedition to Bhrigupanth (6798 m) in the Indian Himalayas. During a three-phase step test at sea level, carrying 0, 4.5, and 9.0 kg backpack weights, oxygen requirements represented 49.5-54.8% VO2 max. Recovery heart rates (HR) at 5-15 s were linearly related to exercise HR. At 4250 m, 5-15 s postexercise HR's were significantly higher than those at SL but returned to SL values after 3 min of rest. At 5000 m, HR's remained higher than those at SL throughout recovery. On returning to 4250 m after 3 weeks at higher altitudes, all postexercise HR's were back to SL values. Supine HR's, higher at altitude than at SL during the ascent, returned to SL rates on return to 4250 m. Hemoglobin and hematocrit increased from 13.7 mg% and 42.4% at SL to 16.4 mg% and 52.6% after the climb. Resting blood pressure was significantly elevated at 4250 m during ascent but returned to SL values on the descent. During the cold pressor test, systolic pressure was unaffected by altitude; diastolic pressure increased less at altitude. While HR was unchanged at SL, a significant increase in HR was observed in postclimb CPT tests, even though perceived discomfort decreased. (Author)

**A82-32010** **Visual acuity in color contrast on cathode ray tubes - Role of luminance, hue, and saturation contrasts.** G. Santucci, J. P. Menu, and C. Valot (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France). *Aviation, Space and Environmental Medicine,* vol. 53, May 1982, p. 478-484. 13 refs. Translation.

Three experiments were conducted on 90 flying personnel to determine the role of luminance, hue, and saturation contrasts on angular visual acuity measured on a CRT system. A Snellen E test object was displayed under various visual acuity conditions on a TV screen, in color contrast, using red, yellow, green, cyan, blue, purple, white, and black. The response system gives response times and quality. The three photocolorimetric parameters are classified through data processing. All other things being equal, the best visual acuity is obtained under a luminance contrast. The first group (red, blue, purple) is better perceived than the second (green, cyan, yellow, white) whatever the other color in simultaneous contrast may be. Higher saturation enhances visual acuity. A curve of mean response times vs. test object sizes is established for the various color couples. The obtained results are of interest for aerospace ergonomics. (Author)

**A82-32011** **Sex differences in cardiac responses to successive apnea periods.** P. Sebert, J. Sanchez, and H. Monod (CNRS, Laboratoire du Physiologie du Travail, Paris, France). *Aviation, Space and Environmental Medicine*, vol. 53, May 1982, p. 485-488. 15 refs.

Cardiac response to breath-holding is generally described as a bradycardia, which is explained by a two-fold mechanism involving the pulmonary mechanoreceptors and the arterial chemoreceptors. This study was conducted to determine the cardiac effects of five successive apnea periods separated by 1 min of free ventilation (FV). Heart rate (HR) and ventilation were measured during this protocol in 12 young subjects (six men, six women). Ventilatory responses during FV periods were similar in both sexes, but HR responses were different during the apnea periods. The men exhibited a bradycardia and the women a tachycardia. Although the statistical significance of the results was weak, they showed a clear tendency which was interpreted as differences in central cardioventilatory interactions. A sex difference in the cardiac consequences of static work from respiratory muscles is also evoked. (Author)

**A82-32012** **The pathophysiology, presentation, and triage of altitude-related decompression sickness associated with hypobaric chamber operation.** D. C. Arthur and R. A. Margulies (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, CT). *Aviation, Space and Environmental Medicine*, vol. 53, May 1982, p. 489-494. 59 refs.

Decompression sickness following excursions to low atmospheric pressures has recently been a topic of confusion and concern. This article provides a reference for management of decompression sickness occuring after exposure to a reduction in ambient pressure in a hypobaric chamber. The pathophysiology, recognition, classification, initial management, definitive treatment, and eventual disposition of these cases are presented in a form which is applicable to all flight surgeons and flight physiologists, especially those with responsibility for utilization of hypobaric chambers. (Author)

**A82-32013** **The aerospace screening electroencephalogram - An analysis of benefits and costs in the U.S. Air Force.** W. D. Everett and S. W. Jenkins (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space and Environmental Medicine*, vol. 53, May 1982, p. 495-501. 18 refs.

Using the techniques of decision analysis, three possible EEG screening strategies for U.S. Air Force pilots are evaluated. Available clinical and epidemiological data are organized so that the relative merits of the three strategies can be assessed by decision makers. The optimal strategy is found to be screening fighter pilot candidates only. Screening all pilot candidates is less 'cost-effective' and using the EEG as a routine screening test in evaluating combat-qualified pilots for nonneurological conditions is the least effective strategy. Needs for further research and unanswered questions are discussed. (Author)

**A82-32075** **Brain mechanisms of visual attention.** R. H. Wurtz, M. E. Goldberg, and D. L. Robinson (National Institutes of Health, National Eye Institute, Bethesda, MD). *Scientific American*, vol. 246, June 1982, p. 124-130, 132, 134, 135.

Neural activity corresponding to the process of the selection of important objects in the visual world has been investigated in experiments with monkeys. By the recording of action potentials in individual brain cells of monkeys trained to fixate on a spot of light, it has been possible to map the receptive fields of individual brain cells and to observe enhancements in the firing rates of cells associated with a region of the visual field toward which a subsequent saccade is directed. For cells in the superior colliculus and frontal eye field, this enhanced response requires a visual stimulus and is spatially selective but comes only as the precursor of a saccade to the corresponding area. In cells of the straite cortex, increases in firing rate are not spatially selective. Only cells in the posterior parietal cortex exhibit a spatially selective enhanced response associated with attention to visual fields in the absence of eye movements. Results thus suggest a neural mechanism of visual attention signalled by enhanced activity in the posterior parietal cortex. A.L.W.

**A82-32154** **Cell morphological, ontogenic, and genetic reactions to 0-g simulation and hyper-g.** W. Briegleb, J. Neubert, A. Schatz, J. R. Hordinsky (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany), and A. Cogoli (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland). *Acta Astronautica*, vol. 9, Jan. 1982, p. 47-50. 17 refs.

Primary cell reaction under conditions of weightlessness are considered. It is found that two different types of reactions occur. One involves a category of more or less irreversible malfunctions, while the second is related to changed intracellular behavior without immediate consequences for the cell's overall functioning. A description is presented of a number of experiments, taking into account genetic reactions, ontogenetic reactions in early development, effects of spatial orientation, periodic protoplasmic movement, and an activation of lymphocytes. On the basis of observations and calculations, it is found that essential innercell structures are stressed by gravity. Cells compensate these effects by using cybernation. G.R.

**A82-32210 *** **Distribution and enantiomeric composition of amino acids in the Murchison meteorite.** M. H. Engel and B. Nagy (Arizona, University, Tucson, AZ). *Nature*, vol. 296, Apr. 29, 1982, p. 837-840. 29 refs. Grant No. NGR-03-002-171.

Studies of the amino acid contents and enantiomeric compositions of a single stone from the Murchison meteorite are reported. Water-extracted and 6M HCl-extracted samples from the meteorite interior of meteorite fragments were analyzed by gas chromatography and combined gas chromatography-chemical ionization mass spectrometry. Examination of the D/L ratios of glutamic acid, aspartic acid, proline, leucine and alanine reveals those amino acids extractable by water to be partially racemized, whereas the acid-extracted amino acids were less racemized. The amino acid composition of the stone is similar to those previously reported, including the absence of serine, threonine, tyrosine phenylalanine and methionine and the presence of unusual amino acids including such as isovaline, alpha-aminoisobutyric acid and pseudoleucine. It is concluded that the most likely mechanism accounting for the occurrence of nonracemic amino acid mixtures in the Murchison meteorite is by extraterrestrial stereoselective synthesis or decomposition reactions. A.L.W.

**A82-32213** **Human body clocks and the timing of sleep.** A. T. Winfree (Purdue University; Institute for Natural Philosophy, West Lafayette, IN). *Nature*, vol. 297, May 6, 1982, p. 23-27. 104 refs. Research supported by the Institute for Natural Philosophy, U.S. Air Force, and NSF.

An individual living in a cave for four months without external time reference slept and awoke at progressively longer and longer intervals. Possible bases for this circadian rhythm are discussed, including the workings of the suprachiasmatic nuclei and the associated retinohypothalamic tracts, and the release of melatonin as influenced by natural or artificial light. Sleep rhythms are often abnormal in manic-depressives and people with little social contact. Insomnia is also often due to abnormal rhythms, and in the light of this, effective treatment can be instituted. The effect of daylight savings, jet-lag, and shift work on the rhythm are discussed, and procedures for hastening adaptation to a new schedule are described. C.D.

**A82-32288 #** **Stress testing and coronary artery disease - Study of 140 cases on tread mill.** M. M. Singh (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), K. V. S. Mani (Indian Air Force, New Delhi, India), and S. Krishnamurti (St. John Medical College, Bangalore, India). *Aviation Medicine*, vol. 25, Dec. 1981, p. 25-31. 20 refs.

**A82-32289 #** **A preliminary study on noise induced hearing loss in serving aircrew of Indian Air Force.** K. S. Soodan and B. N. P. Rao (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *Aviation Medicine*, vol. 25, Dec. 1981, p. 32-34. 10 refs.

**A82-32290 #** **A longitudinal analysis of TH Index and identification of period of acute heat stress.** G. Singh and N. Neelakantan (Air Force Academy, Hyderabad, India). *Aviation Medicine*, vol. 25, Dec. 1981, p. 35-37.

Singh (1978) has found that the Temperature Humidity Index (TH index) is a simple and reliable criterion for the evaluation of thermal comfort. The present study is concerned with an analysis of the TH index over three consecutive years, at different periods of the day, to identify periods of heat intolerance as a basis for advanced planning concerning the assignment of flying tasks. It is found that during the period from April 29 to June 2 symptoms of heat intolerance compromising flight safety may occur in persons at the Air Force Academy particularly during the time from 1330 to 1530 hrs. The nomogram for the TH index can be generally accepted for evaluation of the thermal comfort in operational flying in hot humid weather at various bases. G.R.

**A82-32349** # **Biological experiments in space biology and gravitation.** P. Schiller. *Dornier-Post* (English Edition), no. 1, 1982, p. 36-38.

Equipment for use in biological experiments to be performed on board Spacelab is discussed. Among the necessary equipment for space biology experiments are an incubator, which must maintain a constant temperature in the presence of ambient temperatures ranging from 10 to 35 C, contain few moving parts and be compatible with the Spacelab environment and the installation of a centrifuge, and a space centrifuge for the production of an artificial gravity environment to allow the differentiation between the effects of space radiation and weightlessness. An incubator has been developed to meet these requirements using foam insulation, Peltier elements for heating and cooling and heat transport by a thick aluminum plate. Within this incubator may be placed a centrifuge of maximum rotor diameter 220 mm. Typical experiments envisioned for the system include the study of the daily rhythm in algae and the influence of weightlessness on spore formation in bacteria and yeast. In addition, special procedures have been developed for working with liquids under conditions of weightlessness. A.L.W.

**A82-32390** **The effects of hypoxia on serial response time.** B. Fowler, P. L. White (York University, Downsview, Ontario, Canada), G. R. Wright, and K. N. Ackles (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Ergonomics*, vol. 25, Mar. 1982, p. 189-201. 31 refs.

The effects of hypoxia on choice reaction time and movement time are examined using a visual serial choice reaction time task in which the number of choices and the distance over which a movement has to be made can be varied. Hypoxia is induced with a low percentage oxygen mixture, and blood oxygen saturation is controlled at 64.3%, which is equivalent to 6700 m. It is found that hypoxia increases simple reaction time by decreasing the effective brightness of the stimulus and interfering with some aspect of the information processing system controlling movement time. An examination of individual latency distributions indicates that hypoxia acts to slow performance by shifting the whole distribution. The role of blocking in hypoxia is also investigated by examining the shape of the frequency distributions of response latencies. D.L.G.

**A82-32413** **Perceptual components of computer displays.** R. N. Haber and L. Wilkinson (Illinois, University, Chicago, IL). *IEEE Computer Graphics and Applications*, vol. 2, May 1982, p. 23-26, 28 (5ff.). 41 refs.

Advances in cognitive psychology have revealed the varieties of architecture and operating systems underlying the information processing tasks humans normally perform. Information was obtained regarding a number of principles which specify the optimal organization of information for various types of human information processing. A description is presented of some of these organizational principles, especially those which affect communication between a computer and a user. Since this communication is frequently visual, most of the presented material concerns principles of cognition which apply to graphic information. Attention is given to the structure of cognitive organization, two principles of visual perception, the use of spatial arrangement to represent structure, and the representation of structure with the aid of visual features, movement, three-dimensional objects, and considerations of meaning. G.R.

**A82-32423** * **Velocity and attenuation of sound in arterial tissues.** J. A. Rooney (Maine, University, Orono, ME), P. M. Gammell (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA; Southern California, University, Los Angeles, CA), J. D. Hestenes (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), H. P. Chin, and D. H. Blankenhorn (Southern California, University, Los Angeles, CA). *Acoustical Society of America, Journal*, vol. 71, Feb. 1982, p. 462-466. 15 refs. NASA-supported research; Contract No. NIH-NO1-HV-7-2930.

The velocity of sound in excised human and canine arterial tissues is measured in order to serve as a basis for the development and application of ultrasonic techniques for the diagnosis of atherosclerotic lesions. Measurements of sound velocity at different regions of 11 human and six canine aortas were made by a time delay spectrometer technique at frequencies from 2 to 10 MHz, and compared with ultrasonic attenuation parameters and the results of biochemical assays. Sound velocity is found to increase with increasing attenuation at all frequencies, and with increasing collagen content. A strong dependence of sound velocity on cholesterol content or low calcium contents is not observed, although velocities of up to 2000 m/sec are observed in highly organized calcified lesions. A decrease in velocity with decreasing temperature is also noted. It is thus concluded that it is principally the differences in tissue collagen levels that contribute to image formation according to sound velocity. A.L.W.

**A82-32496** **User response characteristics for sequential displays.** J. R. Ims (Aerospace Corp., Systems Simulation and Analysis Dept., Los Angeles, CA). In: Display technology II; Proceedings of the Meeting, Los Angeles, CA, February 10, 11, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 28-34. Contract No. F04701-80-C-0081.

The obscuring of a brief visual target stimulus (TS) by either a subsequent, preceding, or simultaneous visual mask stimulus (MS), has been of particular interest in connection with studies of human visual information processing. When the contours of the MS do not overlap but are contiguous with the contours of the TS, the procedure is called metacontrast. The present investigation is concerned with a metacontrast study to explore the influence of stimulus variation on Type B (or U-shaped) masking functions. The results of two experiments are discussed, taking into account a comparison of shape and location responses. Applications of the considered characteristics can be found on the ground in air traffic control displays and in the airborne, real-time, threat location, head-up displays. G.R.

**A82-32525** **Eye modelling.** I. Overington (British Aerospace Public, Ltd., Co., Dynamics Group, Bristol, England). In: Assessment of imaging systems: Visible and infrared; Proceedings of the Symposium, Reading, England, April 7-9, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 182-190. 45 refs.

Early stages of visual image processing which influence image formation and transformation in the eye/brain system are discussed and various approaches to visual function modeling are examined. Attention is given to models associated with display/observer interface; foveal threshold performance models relating thresholds of performance to quality, size, and noise of the retinal image and to background luminance; and foveal suprathreshold models establishing the apparent image fidelity. Finally, search models, which seek to relate distributed visual performance to the ability to carry out search tasks on displays, are discussed. V.L.

**A82-32529** **Recognition of thermal images - Effects of scan-line density and signal-to-noise ratio.** A. van Meeteren and S. Mangoubi (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Instituut voor Zintuigfysiologie TNO, Soesterberg, Netherlands). In: Assessment of imaging systems: Visible and infrared; Proceedings of the Symposium, Reading, England, April 7-9, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 230-236. 14 refs.

A series of recognition experiments have been carried out in which 69 thermograms of military vehicles made in the field were displayed indoors using a flying spot scanner system, and subjects were asked to identify the vehicles out of six alternatives. In each session, all 69 pictures were presented in random order with the same scan-line density and the same amount of electronically added noise. Large differences are found in the recognizability between different vehicles and, in particular, between different views of the same vehicle, with hot spot front views being most difficult. An average identification score of 70% is obtained at about two scan lines per meter (measured over real objects) when no noise is added. It is concluded that scan-line density is of primary importance in

**prediction models and in design considerations whereas the effect of noise is small.** V.L.

**A82-32692** **Spectral character of sunlight modulates photosynthesis of previtamin D3 and its photoisomers in human skin.** J. A. MacLaughlin, R. R. Anderson, and M. F. Holick (Massachusetts General Hospital, Boston; MIT, Cambridge, MA). *Science*, vol. 216, May 28, 1982, p. 1001-1003. 12 refs. Research supported by Duro-Test Corp.; Grant No. NIH-AM-27334.

**A82-32800** **Deep-sea bacteria - Isolation in the absence of decompression.** H. W. Jannasch, C. O. Wirsen, and C. D. Taylor (Woods Hole Oceanographic Institution, Woods Hole, MA). *Science*, vol. 216, June 18, 1982, p. 1315-1317. 22 refs. NSF Grants No. OCE-77-19766; No. OCE-79-19178.

Sampling and pure culture isolation of deep-sea bacteria without loss of in situ pressure is required in order to determine the viability of decompression-sensitive strains. This was achieved by using a pressure-retaining sterilizable seawater sampling system in connection with a prepressurized hyperbaric isolation chamber. Rates of growth and substrate uptake of the majority of isolates showed highly barotolerant characteristics, while the remainder (4 out of 15) exhibited barophilic characteristics. (Author)

**A82-32826 *** **Effect of limb immobilization on skeletal muscle.** F. W. Booth (Texas, University, Houston, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1113-1118. 48 refs. Grant No. NIH-AM-19393; Contract No. NAS9-15388.

Current knowledge and questions remaining concerning the effects of limb immobilization on skeletal muscle is reviewed. The most dramatic of these effects is muscle atrophy, which has been noted in cases of muscles fixed at or below their resting length. Immobilization is also accompanied by a substantial decrease in motoneuronal discharges, which results in the conversion of slow-twitch muscle to muscle with fast-twitch characteristics. Sarcolemma effects include no change or a decrease in resting membrane potential, the appearance of extrajunctional acetylcholine receptors, and no change in acetylcholinesterase activity. Evidence of changes in motoneuron after hyperpolarization characteristics suggests that the muscle inactivity is responsible for neuronal changes, rather than vice versa. The rate of protein loss from atrophying muscles is determined solely by the first-order rate constant for degradation. Various other biochemical and functional changes have been noted, including decreased insulin responsiveness and protein synthesis. The model of limb immobilization may also be useful for related studies of muscle adaptation. A.L.W.

**A82-32827** **Characteristics of adjustment of lung diffusing capacity to work.** J. T. Fisher and F. J. Cerny (Buffalo, Children's Hospital, Buffalo, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1124-1127. 11 refs.

The kinetic of changes in the pulmonary diffusing capacity (DL) were studied in the initial 90 sec following the onset of exercise after rest, and during the transition from moderate to heavy exercise. Four male subjects performed a series of trials on a braked bicycle ergometer while being monitored for oxygen uptake, DL for CO, breath He concentrations, and DL for CO post-exercise levels. Measurements were performed under submaximal, maximal, and steady state conditions. The DL response to all exercise conditions was determined by a least-squares curve-fitting analysis to fit a first-order exponential equation. Significant increases in the DL were detected in going from the rest-to-work condition as opposed to the transitions to higher work loads. The results indicate a fast-response DL mechanism which is different from a component which operates in changes of steady-state levels of exercise. M.S.K.

**A82-32828** **Effect of training on beta-adrenergic receptor number in rat heart.** R. L. Moore, M. Riedy, and P. D. Gollnick (Washington State University, Pullman, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1133-1137. 36 refs. Grant No. NIH-HL-18527.

**A82-32829** **Thermoregulatory influences on common carotid blood flow in the dog.** M. A. Baker, M. J. Hawkins, and R. D. Rader (California, University, Riverside, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1138-1146. 36 refs. NSF Grant No. BNS-79-01006; Grant No. PHS-RR-09070.

The relationship of blood flow through the common carotid artery to respiratory evapqration under different conditions of heat stress in the dog is investigated in light of the importance of the common carotid artery as the sole supplier of blood to areas of evaporative cooling in panting mammals. Measurements of common carotid flow were made by an ultrasonic flow probe under conditions of rest at ambient temperatures between 25 and 50 C, hypothalamic heating, and light and strenuous exercise at ambient temperatures of 25 and 35 C. Determinations of respiratory water loss reveal a striking temporal correspondence between evaporation from the nose and mouth and common carotid blood flow. Carotid blood flow and respiratory evaporation are both observed to increase with increasing temperature and hypothalamic heating. Both rates increase rapidly at the onset of exercise, with peak levels related to the peak rectal temperature reached. Most of the increased flow is deduced to be destined for the evaporative surfaces of the mouth, tongue and nose and is thus related to thermoregulatory activity. A.L.W.

**A82-32830** **Central and peripheral inputs in sweating regulation during thermal transients.** J. P. Libert, V. Candas, J. J. Vogt, and P. Mairiaux (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1147-1152. 22 refs.

Eight nude resting men were exposed to consecutive heating-cooling cycles of air and wall temperatures varying from 28 to 45 C in a sawtooth pattern using one of the following slopes: + or - 3.40, 2.27, 1.70, 1.42, or 1.13 C/min. Ambient vapor pressure and air velocity were kept constant at 20.0 mbar and 0.9 m/sec, respectively. Continuous measurements were made of rectal, esophageal, and mean skin temperatures. Local upper limb sweating response was measured from an arm chamber under a local thermal clamp. The results point out the insufficiency of an explanation based on a simple additive function of core and skin temperatures for describing sweating regulation. During transient thermal loads, a multiplicative interaction of mean skin and core temperatures must also be taken into account for describing the central drive for the local sweating response. The interindividual differences observed in the sweating regulation mechanism seem to be linked to a nonlinearity in the response of the thermoregulatory system. (Author)

**A82-32831** **Mechanical properties of rat lung during prolonged hypercapnia.** Y.-L. Lai, W. J. E. Lamm, and J. Hildebrandt (Virginia Mason Research Center, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1156-1160. 25 refs. Grants No. NIH-HL-20568; No. NIH-HL-27064; No. NIH-HL-14854.

**A82-32832** **Effects of hyperventilation on pulmonary blood flow and recirculation time of humans.** S. Matalon, N. Dashkoff, M. S. Nesarajah, F. J. Klocke, and L. E. Farhi (New York, State University; Erie County Medical Center, Buffalo, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1161-1166. 23 refs. Grants No. NIH-HL-23190; No. NIH-HL-15194.

Direct invasive techniques were used to measure the effects of hyperventilation on the pulmonary blood flow and on the recirculation time of helium and of carbon dioxide in humans. The subjects hyperventilated with a tidal volume of 1.5 liters (BTPS) and a frequency of 20 or 30 breaths/min. There was no significant change in pulmonary blood flow from control at either level of hyperventilation. Helium first appeared in the pulmonary artery within 12 sec from the onset of hyperventilation and increased by approximately 0.7% of its equilibrium arterial value per second at both levels of hyperventilation. In contrast, the partial pressure of CO2 in mixed venous blood remained at base-line level until 43 sec from the onset of hyperventilation. It is concluded that hyperventilation at 30 or 45 l/min with constant tidal volume does not significantly affect the value of pulmonary blood flow and that the amount of recirculation of the two gases does not result in underestimation of pulmonary blood flow when this variable is measured by indirect respiratory rebreathing techniques. (Author)

**A82-32833 Finger temperature after a finger-cooling test - Influence of air temperature and smoking.** T. J. M. Cleophas, J. F. M. Fennis, and A. van't Laar (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1167-1171. 27 refs.

**A82-32834 Blood-gas CO2 equilibration in lungs of unanesthetized dogs during hypercapnia.** D. B. Jennings, M. Meyer, T. Stokke, J. Piper, and P. Scheid (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1177-1180. 8 refs.

**A82-32835 Effect of pH on sensation and vastus lateralis electromyogram during cycling exercise.** C. E. Kostka and E. Cafarelli (York University, Toronto, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1181-1185. 29 refs. Natural Sciences and Engineering Research Council of Canada Grant No. 46633.

Exercise-induced blood pH shifts affecting the sensory response and the electromyographic (EMG) activity were examined, as were possible correlations between changes in the EMG and the level of sensory intensity. Six males averaging 24 yr of age performed cycling exercise while being monitored before and after for oxygen uptake volume, heart rate, pH, plasma lactate, and hematocrit, while also being wired for EMG by means of electrodes attached to the vastus lateralis. Acid-base shifts were induced through ingestion of NH4Cl or NaHCO3, and placebos were also administered. Two-factor analysis of variance was performed on all data, and significant F ratios were partitioned with the Newman-Keuls multiple comparison procedure. The data indicated a slight hemodilution in alkalosis, hemoconcentration in acidosis, and hemoconcentration due to exercise alone. Acidosis increased sensory activity during heavy exercise, when plasma lactate was also higher in alkalosis. M.S.K.

**A82-32836 Acute hypervolemia, cardiac performance, and aerobic power during exercise.** I.-L. Kanstrup and B. Ekblom (Karolinska Institutet, Stockholm, Sweden). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1186-1191. 27 refs.

An examination of the effects of plasma volume expansion on aerobic power and cardiac response at different levels of exercise is reported. Fourteen males within 5 years of 27 yr old were examined for heart rate, maximal oxygen uptake, blood lactate concentration, blood and plasma volumes, blood pressure, hematocrit, and cardiac output during maximal and submaximal bicycle exercise. A 6% dextran in solution plasma expansion fluid was fed intravenously into the subjects after the first week of exercise, followed two weeks later by reducing the dextran infusion in eight of the subjects by blood-letting. Blood volume was increased by the infusion, as was the cardiac output, by 7.8 going to 8.7 1/min. It was concluded that acute plasma blood volume expansion produced increased cardiac output and stroke volume at rest and during exercise, increased maximum cardiac output, and the effect was more pronounced during exercise than rest. M.S.K.

**A82-32837 Dynamics of cardiac, respiratory, and metabolic function in men in response to step work load.** Y. Miyamoto, T. Hiura, T. Tamura, T. Nakamura, J. Higuchi, and T. Mikami (Hokkaido University, Sapporo, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1198-1208. 32 refs.

**A82-32838 Reduction of the edema of acute hyperoxic lung injury by granulocyte depletion.** D. M. Shasby, R. B. Fox, R. N. Harada, and J. E. Repine (Colorado, University, Denver, CO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1237-1244. 18 refs. Research supported by the American Heart Association, Kroc Foundation, and Council for Tobacco Research; Grants No. NIH-HL-07085; No. NIH-HL-24248.

**A82-32839 Increases in plasma beta-endorphin/beta-lipotropin immunoreactivity after treadmill running in humans.** P. A. Farrell, W. K. Gates, M. G. Maksud, and W. P. Morgan (Wisconsin, University, Milwaukee; Wisconsin, University, Madison, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1245-1249. 36 refs.

**A82-32840 Effects of acute cold exposure on muscle amino acid and protein in rats.** O. L. K. Smith, G. Huszar, S. B. Davidson, and E. Davis (John B. Pierce Foundation Laboratory; Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1250-1256. 30 refs. Research supported by the Kingsley Foundation; Grant No. NIH-HD-12183.

The effects of acute cold exposure on muscular amino acid release, protein synthesis and protein breakdown are studied in relation to those changes in protein metabolism brought about by fasting. Blood amino acid concentrations were determined in rats functionally hepatectomized (eviscerated) following exposure to 4 C for 24 h or following fasting, and it was found that while plasma amino nitrogen remained about constant in cold exposure and fasting, evisceration lead to an enhanced rise in total amino acids and alanine, with the increment in alanine greatest in starved rats. The injection of insulin or adrenodemedullation in cold-exposed eviscerated rats suppressed the rise in plasma amino acids, while induced diabetes or epinephrine injection in eviscerated nonexposed rats enhanced the rise in plasma alpha-nitrogen. In intact rats, the urinary secretion of 3-methylhistidine was unaffected by cold. Results suggest that amino acid loss from tissues during acute cold stress is due to sympathetic activity, which depresses plasma insulin to levels impairing protein synthesis, rather than the enhanced breakdown of muscle protein or alanine synthesis. A.L.W.

**A82-32841 Effect of aerobic conditioning on cardiovascular response to isometric exercise.** B. J. Morgan, H. L. Brammell, D. L. Sable, M. L. Morton, and L. D. Horwitz (Colorado, University, Denver, CO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1257-1260. 10 refs. Research supported by Ayerst Laboratories; Grant No. NIH-HL-24400.

Trained and untrained muscle groups were examined to compare the cardiovascular response during isometric handgrip exercise (IHE) and quadriceps exercise (IQE) before and after intensive training employing dynamic leg exercise. Beta-adrenaline blocking during the aerobic portion was also tested for effects on the static exercise. Seventeen males between 21-35 were subjected to treadmill and then isometric exercises, then trained in calisthenics for 3 days/wk for 5 weeks. Placebo or propranolol were given the subjects during the training period. Monitoring comprised the plasma propranolol levels, O2 uptake, blood pressure, and pulse rate. Intake of propranolol was found to cause a lessening of the maximum heart rate in both at-rest and treadmill exercise trials. After training, however, only the placebo-added group displayed diminished heart rate and systolic pressure and an increase in the maximal oxygen uptake volume, although limited to trained muscle groups. M.S.K.

**A82-32842 * Induced venous pooling and cardiorespiratory responses to exercise after bed rest.** V. A. Convertino, H. Sandler, P. Webb, and J. F. Annis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA; Webb Associates, Yellow Springs, OH). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, May 1982, p. 1343-1348. 28 refs.

Venous pooling induced by a specially constructed garment is investigated as a possible means for reversing the reduction in maximal oxygen uptake regularly observed following bed rest. Experiments involved a 15-day period of bed rest during which four healthy male subjects, while remaining recumbent in bed, received daily 210-min venous pooling treatments from a reverse gradient garment supplying counterpressure to the torso. Results of exercise testing indicate that while maximal oxygen uptake endurance time and plasma volume were reduced and maximal heart rate increased after bed rest in the control group, those parameters remained essentially unchanged for the group undergoing venous pooling treatment. Results demonstrate the importance of fluid shifts and venous pooling within the cardiovascular system in addition to physical activity to the maintenance of cardiovascular conditioning. A.L.W.

**A82-32843** **A computer linear regression model to determine ventilatory anaerobic threshold.** G. W. Orr, H. J. Green, R. L. Hughson, and G. W. Bennett (Waterloo, University, Waterloo, Ontario, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, May 1982, p. 1349-1352. 6 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada and University of Waterloo.

The anaerobic threshold has generally been determined by simple visual inspection of ventilation or other gas-exchange data obtained during incremental exercise. To establish objective criteria for the determination of anaerobic threshold, a computer algorithm has been developed that models the ventilatory response to exercise using multisegment linear regression. The best-fit regression model is chosen by minimizing the pooled residual sum of squares. The anaerobic threshold is reported as the first break point in that model. The computer-determined anaerobic threshold values for 37 subjects were compared with the subjectively determined values as chosen by four independent observers. The observers' estimates, when pooled to yield a single value for each subject, gave a mean value for the gas-exchange anaerobic threshold of 2.26 + or - 0.69 l/min. The estimates by the computer method averaged 2.21 + or - 0.65 l/min. The correlation coefficient for these two methods was 0.94. (Author)

**A82-32879** **Iterative reconstruction-reprojection - An algorithm for limited data cardiac-computer tomography.** M. Nassi, W. R. Brody, B. P. Medoff, and A. Macovski (Stanford University, Stanford, CA). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, May 1982, p. 333-341. 13 refs. Research supported by the American Heart Association and Gran Mariscal de Ayacucho Foundation of Venezuela; Grant No. NIH-1-R01-HL-25905.

Cardiac X-ray computed tomography (CT) has been limited due to scanning times which are considerably longer (greater than 1 sec) than required to resolve the beating heart (less than 0.1 sec). The otherwise attractive convolution-back projection algorithm is not suited for CT image reconstruction from measurements comprising an incomplete set of projection data. In this paper, an iterative reconstruction-reprojection (IRR) algorithm is proposed for limited projection data CT image reconstruction. At each iteration, the missing views are estimated based on reprojection, which is a software substitute for the scanning process. The standard fan-beam convolution-back projection algorithm is then used for image reconstruction. The proposed IRR algorithm enables the use of convolution-back projection in limited angle-of-view and in limited field-of-view CT cases. The potential of this method for cardiac CT reconstruction is demonstrated using computer simulated data. (Author)

**A82-32880** **Computerized ultrasonic arteriography - A new technique for imaging the carotid bifurcation.** R. D. Miles, J. B. Russell, and D. S. Sumner (Southern Illinois University, Springfield, IL). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, May 1982, p. 378-381. 6 refs.

The development of a new noninvasive computerized technique for producing simultaneous lateral, anterior-posterior, and transverse views of the carotid bifurcation for the diagnosis of occlusive disease is described. These multiplanar views have been used to detect greater than or equal to 40 percent diameter reductions with a sensitivity of 100 percent and a specificity of 85 percent in 94 comparisons with vessel X-rays. (Author)

**A82-33135 †** **The carbohydrase system of the small intestine of rats of various ages following heat and cold exposures (Karbogidraznaia sistema tonkoi kishki krys raznogo vozrasta posle teplovykh i kholodovykh vozdeistvii).** K. R. Rakhimov, A. I. Demidova, and N. V. Aleksandrova (Akademiia Nauk Uzbekskoi SSR, Institut Fiziologii, Tashkent, Uzbek SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Apr. 1982, p. 508-514. 27 refs. In Russian.

**A82-33276** **Taxonomic relations between archaebacteria including 6 novel genera examined by cross hybridization of DNAs and 16S rRNAs.** J. Tu, D. Prangishvilli, H. Huber, G. Wildgruber, W. Zillig, and K. O. Stetter (Max-Planck-Institut für Biochemie, Munich, West Germany). *Journal of Molecular Evolution*, vol. 18, Apr. 1982, p. 109-114. 15 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-51.

**A82-33277** **Enzymatic characterization of peptidic materials isolated from aqueous solutions of ammonium cyanide /pH9/ and hydrocyanic acid /pH6/ exposed to ionizing radiation.** V. Niketic, S. Neskovic (Beograd, Univerzitet, Belgrade, Yugoslavia), Z. Draganic, and I. Draganic (Institut za Nuklearne Nauke, Vinca, Yugoslavia). *Journal of Molecular Evolution*, vol. 18, Apr. 1982, p. 130-136. 31 refs. Research supported by the Serbian Republic Council of Scientific Research.

**A82-33278 *** **Binding of nickel /II/ to 5-prime-nucleoside monophosphates and related compounds.** J. B. Orenberg (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field; San Francisco State University, San Francisco, CA), K. M. Kjos, R. Winkler, J. Link, and J. G. Lawless (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field, CA). *Journal of Molecular Evolution*, vol. 18, Apr. 1982, p. 137-143. 33 refs.

The interactions of Ni(II) cation with a representative suite of purine bases and the respective nucleosides and nucleotides have been studied by ultraviolet difference spectroscopy. Apparent association constants were determined for each system at pH 7.0, using computer linear regression coupled with an iteration technique. The specificity of binding of Ni(2+) for the purine nucleotides studied at pH 7.0 was 5-prime-GMP greater than 5-prime-AMP; a similar ordering was also found for the respective nucleosides and bases. In this study binding was not observed for the suite of pyramidines used, although an Ni(2+) -cytidine complex has been observed (Fiskin and Beer, 1965). It was also found that Ni(2+) bound more strongly to the purine 5-prime-nucleotides than to the respective nucleosides and bases. These trends are explained in terms of metal-ligand bonds and available bonding positions on the ligands. A role for metal-ion-nucleotide types of complexes is suggested in the processes that might have given rise to the origin of life. (Author)

**A82-33280 *** **Comets - Chemistry and chemical evolution.** B. Donn (NASA, Goddard Space Flight Center, Laboratory for Extraterrestrial Physics, Greenbelt, MD). *Journal of Molecular Evolution*, vol. 18, May 1, 1982, p. 157-160. 45 refs.

Research on the chemical composition and conditions in comets and their possible role in the origin of life on earth is surveyed. The inorganic and organic compounds and ions indicated in the ultraviolet and visible spectra of comets are noted, and evidence for the existence of at least a small proportion of complex organic molecules in comets is presented. It is then pointed out that while cometary material could have reached the earth and provided volatile elements from which biochemical compounds could have formed, it is unlikely that a cometary nucleus could have withstood the temperatures and pressures necessary to sustain an environment in which life could have originated. A.L.W.

**A82-33282** **Organic synthesis from reducing models of the atmosphere of the primitive earth with UV light and electric discharges.** A. R. Bossard, F. Raulin, D. Mourey, and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). *Journal of Molecular Evolution*, vol. 18, May 1, 1982, p. 173-178. 34 refs. Research supported by the Centre National d'Etudes Spatiales.

The organic syntheses obtained in experiments with a reducing model of the primitive earth atmosphere where energy is supplied by UV light and electrical discharges are compared. A review of the results of experiments conducted with far-UV radiation and corona discharges in gaseous mixtures of methane with varying amounts of nitrogen, ammonia and water vapor indicates UV light to favor the production of saturated over unsaturated carbon chains, while electrical discharges are efficient producers of unsaturated carbon chains. In experiments with $CH_4$-$NH_3$ and $CH_4$-$N_2$ mixtures, UV radiation leads to the formation of HCN, $CH_3CN$ and $C_2H_5CN$, whereas electric discharges can produce nitriles in $CH_4$-$N_2$ mixtures. Finally, it has been noted that only limited quantities of oxygen-containing organics are synthesized in $CH_4$-$H_2O$ mixtures using either UV light or electric discharges. It is thus concluded that, despite their relative scarceness, electric discharges played the major role in the synthesis of atmospheric precursors of biomonomers. A.L.W.

**A82-33283 *** **Interaction between ATP, metal ions, glycine, and several minerals.** J. Rishpon, P. J. O'Hara, J. G. Lawless (NASA, Ames Research Center, Moffett Field, CA), and N. Lahav. *Journal of*

*Molecular Evolution,* vol. 18, May 1, 1982, p. 179-184. 21 refs.

Interactions between ATP, glycine and montmorillonite and kaolinite clay minerals in the presence of various metal cations are investigated. The adsorption of adenine nucleotides on clays and Al(OH)3 was measured as a function of pH, and glycine condensation was followed in the presence of ATP, ZnCl2, MgCl2 and either kaolinite or montmorillonite. The amounts of ATP and ADP adsorbed are found to decrease with increasing Ph, and to be considerably enhanced in experiments with Mg(2+)- and Zn(2+)-montmorillonite with respect to Na(+)-montmorillonite. The effects of divalent cations are less marked in kaolinite. Results for Al(OH)3 show the importance of adsorption at clay platelet edges at high pH. The decomposition of ATP during drying at high temperature is observed to be inhibited by small amounts of clay, vacuum, or Mg(2+) or Zn(2+) ions, and to be accompanied by peptide formation in the presence of glycine. Results suggest the importance of Zn(2+) and Mg(2+) in chemical evolution. A.L.W.

**A82-33284 * Oligonucleotide formation catalyzed by mononucleotide matrices.** R. Lohrmann (Salk Institute for Biological Studies, San Diego, CA). *Journal of Molecular Evolution,* vol. 18, May 1, 1982, p. 185-195. 16 refs. Grants No. NGR-05-067-001; No. NIH-GM-13435.

Pb(2+)-containing precipitates of mononucleotides form matrices which catalyze the self-condensation of nucleotide 5-prime-phosphorimidazolides and their condensation with nucleosides. The reactions exhibit base-pairing specificity between matrix nucleotide and substrate, and usually follow the Watson-Crick pairing rules. Although purine polynucleotides do not facilitate the oligomerization of pyrimidine nucleotide monomers in solution, it is interesting that purine-containing matrices do catalyze such a reaction. The significance of the results in the context of the prebiotic evolution of polynucleotides is discussed. (Author)

**A82-33285 * Synthesis of phosphatidylcholine under possible primitive earth conditions.** M. Rao, J. Eichberg, and J. Oro (Houston, University, Houston, TX). *Journal of Molecular Evolution,* vol. 18, May 1, 1982, p. 196-202. 33 refs. Research supported by the Robert A. Welch Foundation; Grants No. NGR-44-004-002; No. NIH-NS-12493-04.

Using a primitive earth evaporating pond model, the synthesis of phosphatidylcholine was accomplished when a reaction mixture of choline chloride and disodium phosphatidate, in the presence of cyanamide and traces of acid, was evaporated and heated at temperatures ranging from 25 to 100 C for 7 hours. Optimum yields of about 15% were obtained at 80 C. Phosphatidylcholine was identified by chromatographic, chemical and enzymatic degradation methods. On enzymatic hydrolysis with phospholipase A2 and phospholipase C, lysophosphatidylcholine and phosphorylcholine were formed, respectively. Alkaline hydrolysis gave glycerophosphorylcholine. The synthesis of phosphatidylcholine as the major compound was accompanied by the formation of lysophosphatidylcholine in smaller amounts. Cyanamide was found to be essential for the formation of phosphatidylcholine, and only traces of HCl, of the order of that required to convert the disodium phosphatidate to free phosphatidic acid were found necessary for the synthesis. This work suggests that phosphatidylcholine, which is an essential component of most biological membranes, could have been synthesized on the primitive earth. (Author)

**A82-33286 Encapsulation of macromolecules by lipid vesicles under simulated prebiotic conditions.** D. W. Deamer and G. L. Barchfeld (California, University, Davis, CA). *Journal of Molecular Evolution,* vol. 18, May 1, 1982, p. 203-206. 9 refs.

Phospholipid vesicles (liposomes) were subjected to dehydration-hydration cycles in the presence of 6-carboxyfluorescein or salmon sperm DNA. It was found that the vesicles fused into multilamellar structures during dehydration with solutes trapped between the lamellae. Upon rehydration the lamellae swelled and formed large vesicular structures containing solute. This model can be used to study encapsulation of macromolecules by lipid membranes to form protocellular structures under prebiotic conditions. (Author)

**A82-33287 * A theory for the origin of a self-replicating chemical system. II - Computer simulation of the autogen.** D. H. White and M. S. Raab (Santa Clara, University, Santa Clara, CA). *Journal of Molecular Evolution,* vol. 18, May 1, 1982, p. 207-216. 14 refs. Grants No. NCA2-OR-685-702; No. NCA2-OR-685-806.

In order to better understand the feasibility and limitations of the autogen (White 1980), a computer simulation based on the fluctuating clay environment was used to test whether autocatalytic growth would occur under various conditions. The results suggest that overall accuracies of replication and translation in the range of 90% and 10%, and protoenzyme turnover numbers of 10-120 monomers/protoenzyme/day are adequate for exponential growth. Nucleation of the components of the autogen from random background oligomers would be extremely rapid if oligomers lengths 2-6 were adequately functional, whereas oligomer lengths much greater than 10 are prohibited. The autogen would most likely nucleate and grow to dominance either rapidly (10-100 cycles of roughly 1 day each) or not at all. (Author)

**A82-33288 * Pyrolysis of Precambrian kerogens - Constraints and capabilities.** B. Nagy (Arizona, University, Tucson, AZ). *Journal of Molecular Evolution,* vol. 18, May 1, 1982, p. 217-220. 41 refs. Grant No. NGR-03-002-171.

Precambrian kerogens are currently considered to be the primary candidates for the search of biochemical fossils. Degradation of kerogens by relatively 'mild' pyrolysis techniques, such as under high vacuum, can liberate indicative structural moieties which were incorporated in, and perhaps shielded by, these solid and highly condensed, basically aromatic substances. It is necessary to observe analytical constraints (sample size and shape, temperature, pressure, time, etc.) in order to prevent an overabundant yield of secondary pyrolyzates (inter- and intramolecular rearrangements) which can prevent kerogen characterization. Potential biochemical fossils have been found in Precambrian kerogens. Demonstratable syngenetic biochemical fossils are expected after kerogen diagenesis and catagenesis is understood in sufficient detail, and when pyrolysis is augmented by multiple, improved analytical techniques. (Author)

**A82-33394 † Industrial hygiene and the prophylaxis of occupational diseases in work with lasers (Gigiena truda i profilaktika profpatologii pri rabote s lazerami).** V. P. Zhokhov, A. A. Komarova, L. I. Maksimova, V. R. Muratov, Iu. P. Pal'tsev, and A. I. Semenov. Moscow, Izdatel'stvo Meditsina, 1980. 208 p. 109 refs. In Russian.

The book treats questions of the protection of workers from laser radiation and methods for the prophylaxis and therapy of laser-induced injuries in persons exposed to laser radiation in the work environment. Following a review of the fundamental principles and characteristics of lasers and the areas of laser applications, the laser radiation field is discussed, with particular emphasis on methods for the measurement of coherent field intensity. Mechanisms for the biological effects of laser radiation are examined, and attention is given to the effects of laser radiation on the visual organs and on the skin. Clinical data concerning the physiological condition of laser specialists is reviewed, and the establishment of norms for laser radiation is discussed. Aspects of industrial hygiene in work with lasers are then considered, including the shielding of the visual organs from direct and reflected laser radiation and the medical surveillance of laser workers. A.L.W.

**A82-33595** **Studies on structure and function of chloroplasts - Reconstitution of photophosphorylation activity by combining the deficient membranes of chloroplasts with crista membrane fragments of mitochondria.** S. Li, J. Xiao, and J. Cai (Chinese Academy of Sciences, Plant Physiology Institute, Shanghai, People's Republic of China). *Scientia Sinica*, vol. 24, Nov. 1981, p. 1575-1584. 8 refs.

**A82-33600** **The nature of radiation damage of haemopoietic stem cells under continuous irradiation at low dose rate.** Z. Wu, X. Jiang, S. Shen, S. Tan, and H. Xue (Academy of Military Medical Sciences, Institute of Radiation Medicine, Beijing, People's Republic of China). *Scientia Sinica*, vol. 24, Dec. 1981, p. 1743-1752. 15 refs.

**A82-33726** † **Myoglobinemia as a criterion for the early diagnosis of acute myocardial infarction /Literature review/ (Mioglobinemiia kak kriterii rannei diagnostiki ostrogo infarkta miokarda /Obzor literatury/).** D. Ia. Shurygin, Iu. N. Shishmarev, and A. M. Grachev. *Voenno-Meditsinskii Zhurnal*, Apr. 1982, p. 33-37. 33 refs. In Russian.

The potential for the use of myoglobinemia as an indicator of cardiac damage is considered on the basis of literature data. The specificity of other biochemical indicators of myocardial infarction is discussed and it is pointed out that in contrast to these factors, the differential diagnosis of heart damage from elevated blood myoglobin levels poses no problem. Spectrophotometric and immunologic methods for the detection of myoglobinemia are examined, and experience with the use of these methods in patients with acute myocardial infarction is reviewed. Analysis of the time characteristics of the rise in plasma myoglobin following acute myocardial infarction as well as its complications, stenocardia, muscular diseases and muscular damage indicates that a transitory myoglobinemia is a reliable indicator of acute myocardial infarction, appearing earlier than elevations in plasma enzyme and isoenzyme levels. A.L.W.

**A82-33727** † **Psychosomatic self-regulation - An effective method for sustaining pilot work capacity during a prolonged flight (Psikhosomaticheskaia samoreguliatsiia - Effektivnyi metod podderzhaniia rabotosposobnosti letchika v ditel'nom polete).** S. G. Mel'nik and A. V. Shakula. *Voenno-Meditsinskii Zhurnal*, Apr. 1982, p. 47-50. 13 refs. In Russian.

Possibilities for the use of psychosomatic self-regulation as a technique for the correction of pilot work capacity over the course of a prolonged flight are examined. The method involves training in the attainment of a state of muscular relaxation, the development of abilities in voluntary vascular dilation, voluntary respiratory control, heart rate control and cerebral vascular control, as well as skills in autogenic activation. Laboratory simulations and experiments under actual flight conditions have shown the periodic performance of autogenic stimulation to improve pilot tracking performance and mental abilities over the course of a 6-hour flight, while slowing the decline in the condition of the visual analyzer, auditory discrimination, and hemispherical asymmetry, decreasing subjective fatigue and improving flight performance. Psychosomatic self regulation thus allows the in-flight self-correction of pilot physiological condition and work capacity related to the activation of the central nervous system under conditions of growing fatigue. A.L.W.

**A82-33728** † **The prevention of dysadaptive changes in sailors at sea (Preduprezhdenie dizadaptivnykh izmenenii u moriakov v plavanii).** V. S. Novikov and V. N. Bortnovskii. *Voenno-Meditsinskii Zhurnal*, Apr. 1982, p. 50-52. 7 refs. In Russian.

Measures for the prevention of dysadaptive changes in immune status and physical condition were investigated in sailors over the course of a prolonged voyage. Immunobiological reactivity and physical work capacity were evaluated at the start, middle and conclusion of the voyage in 10 subjects undergoing periodic physical exercise, ultraviolet radiation exposure, vitamin C supplementation and electric sleep. Increases in leukocyte absorptive and digestive capacities and reductions in leukocytolysis and the microbial population of the skin indicative of positive changes in immunologic reactivity were found in the experimental group, while negative changes in these parameters were found in the controls. Decreases in exercise tolerance were observed in both groups, although by the end of the voyage tolerance was 14.3% higher in the experimental than in the control group. The combination of measures employed is thus recommended for increasing tolerance to adverse factors, maintaining work capacity and preventing the development of premorbid and pathological conditions. A.L.W.

**A82-33749** **The roles of axes of symmetry in orientation illusions.** A. A. Hartley (Scripps College, Claremont, CA). *Perception and Psychophysics*, vol. 31, no. 4, Apr. 1982, p. 367-375. 22 refs.

The lines of a surrounding figure can induce illusory distortion in the apparent orientation of an enclosed line. The axes of symmetry of the figure have been implicated in this distortion. A series of experiments showed generally that the effects are attributable to the axes of bilateral symmetry rather than to less restrictively defined axes of topological symmetry, although those axes may produce other illusory effects. Furthermore, the distortions affect the whole line rather than only parts of it. These results are consistent with interactions of thy lines in the orientation rather than position domain. It is suggested that axes of symmetry may play an important role in pattern recognition. (Author)

**A82-33751** **Man under vibration: Suffering and protection.** Edited by G. Bianchi (Milano, Politecnico, Milan, Italy), K. V. Frolov (Akademiia Nauk SSSR, Institut Mashinovedeniia, Moscow, USSR), and A. Oledzki (Warszawa, Politechnika, Warsaw, Poland). Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers (Studies in Environmental Science. Volume 13), 1981. 451 p. $74.50.

Among the topics discussed are the effects of muscle vibration and joint oscillation on human motor mechanisms, the immediate effect of vibrations transmitted to the hand, the determination of ankle joint muscle biomechanical characteristics by means of vibration tests, the dynamic modeling and vibratory response of human subjects in the heave mode, an anthropometric model of the human hand, and nonlinear effects connected with biomechanical system spatial vibrations. Also considered are an automatic system for the measurement of vibration parameters affecting the human body, the measurement of contact forces between the human body and mechanical equipment, kinematic-type, active vibroisolation devices, vibroisolation in portable tools, and the properties of nonlinear vibration protection systems with different dissipative characteristics. O.C.

**A82-33752** **Modern problems of vibrations in the systems 'man-machine-environment'.** K. V. Frolov (Mechanical Engineering Research Institute, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 1-41. 42 refs.

The characteristics of vibrations to which human operators are subject in industrial production environments are described, and the mechanical and physiological responses of the human body to such vibrations are analyzed. Experimental studies of the dynamic characteristics of the body and arms of an operator show a significant change in the parameters of dynamic biomechanical system models, in connection with changes of position or degree of muscular tension. Attention is given the instability of the human body's dynamic characteristics under long-term vibrational influence, and active-change modeling of the body's mechanical parameters is discussed. O.C.

**A82-33753** **Effects of muscle vibration and joint oscillation on human motor mechanisms.** G. C. Agarwal (Illinois, University, Chicago, Il) and G. L. Gottlieb (Rush-Presbyterian-St. Luke's Medical Center, Chicago, IL). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1981, p. 42-54. 31 refs. NSF Grant No. ENG-76-08754; Grants No. NIH-NS-12877; No. NIH-NS-00196.

The tonic vibration reflex (TVR) affects a joint's response to sinusoidal oscillation in the same facilitatory manner that is seen with tonic voluntary contraction. In contrast, tonic voluntary contraction facilitates the myotatic reflex while the TVR inhibits it in the soleus muscle. The degree of myotatic reflex inhibition is input frequency dependent. In discrete tracking task, vibration increases simple and choice reaction times. However, the error correction time is not influenced. (Author)

**A82-33754** **Effect of base oscillations on the human skeletal muscle and joint forces in a standing posture.** A. Seireg and R. Arvikar (Wisconsin, University, Madison, WI). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1981, p. 55-64. 10 refs.

A comprehensive computer model of the musculoskeletal system is utilized in conjunction with published data on human response and tolerances to vibration for the calculation of the muscle forces and the stress variation at different base frequencies. The results show that the peak pressures on the spinal column are approximately the same as those calculated at the limit of the subject's weight lifting capability. (Author)

**A82-33755** **Mechanoreceptor systems of the organism from the viewpoint of vibrational biomechanics.** A. S. Mirkin and S. V. Petukhov (Mechanical Engineering Research Institute, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 65-75. 13 refs.

A discussion is presented of results of biomechanical studies of vestibular apparatus and Pacinian-corpuscle mechanoreceptor systems subjected to vibration, with attention to the frequency characteristics of the latter. The importance of the 100 Hz frequency for both mechanoreceptor systems is noted, and a scale model of the human semicircular canal system, constructed on the basis of dynamical similarity theory, is described. The model establishes purely mechanical reasons for the entering of false vestibular information into the nervous system under the condition of low-frequency angular vibration of the head. O.C.

**A82-33756** **Immediate effects of vibration transmitted to the hand.** H. Dupuis and G. Jansen (Mainz, Universität, Mainz, West Germany). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 76-86. 10 refs.

The biomechanical behavior of the hand-arm system is studied, with attention to its subjective sensations and physiological changes, under conditions of vibration transmitted to the hand by vibrating tools, machinery and work pieces. It is found that the wrist, and with less amplification the elbow, show resonances at 10-20 Hz. In addition, it is determined that subjective perception decreases with increasing frequency at constant acceleration, and that the application of static grip force in the absence of vibration causes significant skin temperature reduction although it remains at the same, lowered level under vibration stress. O.C.

**A82-33757** **Basic principles for hygienic rating of industrial whole-body vibration in the U.S.S.R.** A. A. Menshov (Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 87-96. 10 refs.

It is noted that, despite resonance frequency similarities, the principles which are the bases of the USSR's hygienic rating for whole-body vibration encountered by industrial, agricultural and transportation workers differ from those of the International Standard ISO-2631. The Soviet rating is based on octave-band-measured vibrovelocity, in contrast to the vibroaccelerations of the International Standard. The experimental bases for vibrovelocity evaluation standards were established by Menshov (1971). Tabular data are presented on changes of physiological function due to vibration exposure. O.C.

**A82-33758** **Effects of vibrating tools on the peripheral vessels and the peripheral nervous system in workers of an iron foundry - Preventive suggestions.** R. Gilioli, M. Tomasini, C. Bulgheroni, A. Grieco (Clinica del Lavoro, Milan, Italy), and F. Grazia (Istituto Neurologico, Milan, Italy). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 97-129. 6 refs.

Four task-related categories of risk, encompassing both peripheral angiological and neurological impairment, are determined by an investigation of the upper limbs of iron foundry workers using vibrating tools. A questionnaire was devised for the compilation of subjective symptoms, and objective signs of angiopathy were obtained through clinical observation and photopletismography in basal conditions and after the cooling of hands in running water. The risk categories are for the tasks of finishers, former finishers not exposed to the foundry vibration environment for a mean period of three years, mechanical molders, and manual molders. While finishers and former finishers were found to have sustained peripheral neurogenic lesions, both categories of molders had normal neurological characteristics. O.C.

**A82-33759** **Comparative analysis of human and subhuman operator performance in a control loop.** P. K. Bhagat, V. N. Gupta, and D. F. McCoy (Kentucky, University, Lexington, KY). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 130-140.

A preprogrammable, electronic visual tracking facility was used in an attempt to compare the performance of human operators with that of three Rhesus monkeys which had been trained by means of electric shock negative reinforcement. A parameter-optimization algorithm was used to compute a five-parameter performance model with describing function data obtained under a compensatory tracking task, for the cases of the monkeys and of two human subjects. No significant differences between the two species are found in the results, with transportation lag ranging from 0.08 to 0.19 sec. The similarity in functional relationships between human and subhuman operators supports monkey-man extrapolations in stressful tracking situations. O.C.

**A82-33760** **The determination of the equivalent biomechanical characteristics of the ankle joint muscles by vibration tests.** V. M. Zatsiorskii, A. S. Aruin, L. M. Raisin, and G. Ia. Panovko (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 166-175. 14 refs.

A method is developed for investigation of the biomechanical characteristics of lower extremity muscles, under conditions similar to natural ones, and values are determined for the equivalent damping coefficient and stiffness factor of human ankle joint muscles as a function of the force manifested. It is found through 2-70 Hz vibrating platform tests that, while muscle stiffness characteristics are lower than those calculated by means of damped oscillations, they are in agreement with the damping coefficient value. It is also determined that muscle stiffness increases with measured force. O.C.

**A82-33761** **Dynamic modeling and vibratory response of human subjects in heave mode.** D. P. Garg (Duke University, Durham, NC). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 176-189. 22 refs.

A 16-mass, lumped-parameter dynamic model of human subjects which reproduces measured response peaks at various resonance frequencies and conforms adequately to experimental response curves at the remaining frequencies is described. It is shown by results that human vibration transmissibility may be measured in the 1-50 Hz frequency range. In addition, a linear lumped-parameter model which both accounts for human anatomy and matches average test frequency response in magnitude and phase angle can be derived. It is found that standing human subjects under vibratory input conditions exhibit four predominant peaks at approximately 2, 6, 20 and 33 Hz, with a resonance near 43 Hz due to head rotation. The model presented may be used for the prediction of human body responses to other types and combinations of inputs, along with the compilation of prosthetics-design data. O.C.

**A82-33762** **Some problems of identification and modelling of the human body.** M. Ksiazek (Krakow, Politechnika, Krakow, Poland). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 200-209. 11 refs.

The modeling of the sitting human body when it is subjected to vertical harmonic vibration is undertaken by means of a procedure based on electric circuit theory. The possibilities and difficulties inherent in the application of mechanical impedance to the identification and modeling of the human body, when it is considered as a mechanical passive system, are also discussed. It is found that the two mechanical models of the sitting human body presented consist of dynamical, independent subsystems having the same structures. These subsystems may be taken to represent the head and spinal column and the trunk. O.C.

**A82-33763** **Non-linear effects connected with the spatial vibrations of biomechanical systems.** B. A. Potemkin and K. V. Frolov (Mechanical Engineering Research Institute, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 226-234. 9 refs.

The forced dynamic response of the human body under vibration is investigated through several simple classes of mechanical models, with attention given to that class of spatial models which permit the determination of detailed nonlinear effects due to the active and passive properties of biomechanical systems. The observed nonlinear phenomena are found to be more essential at high vibration amplitude, leading to their appearance at low excitation frequencies. It is concluded that human muscle activity under vibrational excitation is both specific and sensitive, vindicating the use of active biomechanical models for the case of low-frequency vibration. O.C.

**A82-33764** **Vibration defence of man - Questions of modeling.** O. S. Naraikin and G. Ia. Panovko (Akademiia Nauk SSSR, Institut Mashinovedeniia, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 235-246. 10 refs.

A classificatory scheme for methods used in the defense of the human body against vibration is presented, along with a discussion of experimental techniques for the determination of dynamic characteristics and the definition of mechanical models for the human body. A distributed parameter mechanical model is suggested, and model parameters are calculated. Head, shin, thigh and foot elements of the model are rigid, while the spinal column is represented by an elastic pivot. O.C.

**A82-33765** **Automatic system for study and measurement of vibration parameters affecting human body.** V. V. Kliuev, V. A. Klochko, V. G. Gradetskii, D. A. Grechinskii, V. G. Rygalin, and Iu. V. Ivanov (Nauchno-Issledovatel'skii Institut Introskopii, Moscow, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co;Warsaw,PWN-Polish Scientific Publishers, 1981,247-260

An automatic system is proposed for the measurement of vibration process parameters affecting the human body. Detailed flowcharting of the system's software and hardware is given, showing the use of data input modules which control other modules, data acquisition modules for sampling and discretization of analog values, processing modules which conduct analyses of input data, control and rewrite modules, and data output modules which manage display units. The perspective afforded by the system described allows not only the prompt evaluation of vibration effects, but also the recommendation of improvements in vibration protection methods. O.C.

**A82-33766** **Critical assessment of common methods to determine vibrational stress of hand-arm system.** P. Krause, A. Orban, K. J. Panzke, and K. Popov (Ministry of Building, Techno-Scientific Centre of Safety Engineering, East Germany). In: Man under vibration: Suffering and protection.

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Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 261-274.

Common measuring method errors in the study of the hand-arm system are discussed. It is shown that contact and pressure forces must be taken into account, in addition to the time function of the mechanical vibrations applied. The extent to which hand-arm system vibrations propagate through soft and osseous tissue, as well as joints, is noted. It is recommended in light of this that correction factors depending on tissue size and thickness be given for measurements in which vibration pick-ups are attached to hand-arm system surfaces. O.C.

**A82-33767** **On the measuring of contact forces between human body and equipment.** A. Oledzki (Warszawa, Politechnika, Warsaw, Poland). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 275-286.

Descriptions are given of the design and properties of three types of transducers used in the measurement of contact forces between the human body and mechanical equipment. All the transducers are applicable to dynamic measurement. A novel method is described for the measurement of contact forces which, although initially applied to static measurement, may also be used for the determination of the contact forces caused by vibrations. The conventionally used devices include miniature dynamometers, pneumatic gages, and electrokinetic transducers. O.C.

**A82-33768** **A survey of vibration control methods.** A. Muszynska (Polska Akademia Nauk, Instytut Podstawowych Problemow Techniki, Warsaw, Poland). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 287-314.

Vibration control methods, involving automatic structural or parametric modifications by means of external power supplies with feedback control as well as simpler passive methods, are discussed. Attention is given to a mathematical model for the formulation of vibration control criteria, and to the dissipation of mechanical energy by radiation, internal or material damping, slip damping during flexural deformation, fluid pumping at joints, and the use of sandwich construction and antivibration mountings. It is noted that analysis and modification methods developed for industrial machinery-scale applications may be scaled down to sporting equipment or up to large civil, astronautical and marine engineering problems. O.C.

**A82-33769** **Optimization of stochastic man-machine systems.** R. I. Furunzhiev and A. Ia. Ismailov (Belorusskii Politekhnicheskii Institut, Minsk, Belorussian SSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 315-329. 15 refs.

The comparative efficiency of stochastic optimization methods in the design of stochastic machine systems is considered, in light of the performance of seven algorithms on problems of test functions, test models of stochastic vibratory systems, and models of wheeled vehicles employing a nonlinear vibration-isolation system for random disturbances. Emphasis is put on the comparative convergence time of the stochastic algorithms considered. Best results were obtained with the stochastic vibratory object method, which required five hours of computation time for the asymptotic optimization of a man-machine system. O.C.

**A82-33770** **Vibration machines and man.** E. I. Shemiakin, N. P. Benevolenskaia, and A. Ia. Tishkov (Akademiia Nauk SSSR, Institut Gornogo Dela, Novosibirsk, USSR). In: Man under vibration: Suffering and protection. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN - Polish Scientific Publishers, 1981, p. 346-352.

The effects of vibrating mining machinery employed in the Soviet Union on the human body is considered, with attention to trends in the mitigation of harmful vibration effects on human operators. Among the man-machine systems studied are electric mine locomotives, loading belts and conveyors and vibrating screens. The use of the traveling wave principle in vibrating machines is cited as a case of successful vibration reduction in mining machinery. O.C.

**A82-33895** # **Solar bacterial biomass farm for space vehicles.** H. Tributsch (Berlin, Freie UniversitÄt, Berlin, West Germany). *Astronautics and Aeronautics*, vol. 20, June 1982, p. 66-68. 8 refs.

The use of the bacterium Thiobacillus ferrooxidans to produce biomass ten times as efficiently as the best agricultural land is discussed. A solution of Fe(2+), carbon dioxide from the air, and oxygen is all that the bacterium needs to grow and multiply and produce biomass at 35 percent efficiency. Depending on what process is used to manufacture the Fe(2+), the final efficiency would range from 6 to 17.7 percent, compared to the 1 percent efficiency of photosynthesis. A solar farm in space producing biomass by means of a continuous-flow apparatus is described. The bacterium has characteristics suitable for living in outer space: ability to grow in the dark, toleration of harsh living conditions, and resistance to radiation. C.D.

**A82-33906** * # **Studies of planning behavior of aircraft pilots in normal, abnormal, and emergency situations.** G. Johannsen, W. B. Rouse, and K. Hillmann. Research supported by NASA; Grants No. NsG-2119; No. NAG2-123. Wachtberg-Werthhoven, West Germany, Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Anthropotechnik (Forschungsinstitut für Anthropotechnik, Bericht, No. 53), 1981. 91 p. 17 refs. In English and German. $4.10.

A methodology for the study of human planning behavior in complex dynamic systems is presented and applied to the study of aircraft pilot behavior in normal, abnormal and emergency situations. The method measures the depth of planning, that is the level of detail employed with respect to a specific task, according to responses to a verbal questionnaire, and compares planning depth with variables relating to time, task criticality and the probability of increased task difficulty. In two series of experiments, depth of planning was measured on a five- or ten-point scale during various phases of flight in a HFB-320 simulator under normal flight conditions, abnormal scenarios involving temporary runway closure due to snow removal or temporary CAT-III conditions due to a dense fog, and emergency scenarios involving engine shut-down or hydraulic pressure loss. Results reveal a dichotomy between event-driven and time-driven planning, different effects of automation in abnormal and emergency scenarios and a low correlation between depth of planning and workload or flight performance. A.L.W.

**A82-33909** # **Working in space.** G. V. Butler and H. L. Wolbers (McDonnell Douglas Astronautics Co., Huntington Beach, CA). *AIAA Student Journal*, vol. 19, Fall 1981, p. 2-9, 47.

Aspects of the history, current status and future plans for humans working in space are discussed. Following a brief outline of the development of manned space flight, the facilities on board the Skylab orbital station are described, and experience gained in spacecraft maintenance and repair as well as the testing of a manned maneuvering unit and the operation of scientific experiments on Skylab is related. The potentials of the reusable Space Transportation System are then discussed in relation to the benefits that the transport of persons with a variety of talents may have for various world problems. Changes in the nature of the tasks to be performed as space missions evolve from short sorties to permanent installations supporting a large work force, as exemplified by the proposed Space Operations Center are then considered, with particular attention given to crew work schedules and space construction activities. It is concluded that almost any task that man can perform on the ground can also be performed in space, provided adequate tools and positioning restraints are used. A.L.W.

**A82-33910** # **Sociological aspects of permanent manned occupancy of space.** B. J. Bluth (California State University, Northridge, CA). *AIAA Student Journal*, vol. 19, Fall 1981, p. 11-15, 48.

Potential difficulties in group dynamics which may occur in long-term space habitation by a large group, such as the crew envisioned for the Space Operations Center, are discussed. Previous studies of the social aspects of small groups in confined, isolated and stressful environments, including Antarctic stations, oceanographic research vessels, submarines, undersea laboratories and space simulators are reviewed, and Soviet experience with extended-duration space missions is considered. It is pointed out that in none of these experiences did prior evaluations predict the observed difficulties in adjustment, which included interpersonal hostility, hostility towards the ground crew, boredom, depression and exhaustion. The nature and possible means of relieving the principle sources of stress to be encountered in a long-duration space mission are then discussed, with particular attention given to conflicting social functions, group size, group composition, group organization, scheduling and architectural factors. A.L.W.

**A82-34247** **Studies on the property and transplantation of hemopoietic stem cells from peripheral blood.** Z. Wu, S. Shen, A. Zhu, H. Xue, C. Yan, and R. Zhu (Academy of Military Medical Sciences, Institute of Radiation Medicine, Beijing, People's Republic of China). *Scientia Sinica*, vol. 24, Sept. 1981, p. 1302-1312. 17 refs.

Comparative studies of the properties of murine hemopoietic stem cells from different sources revealed that the peripheral hemopoietic stem cell is relatively weaker than the hemopoietic stem cell from bone marrow in promoting the recovery of hemopoiesis in irradiated animals. This is due to the heterogenity of the stem cell population in which some aged cell subpopulations are coexisting. The modified potential in proliferation and differentiation of hemopoietic stem cells in the peripheral blood seems to be irreversible under normal physiological conditions. In a preliminary experiment, the use of an antithymocyte immunoglobulin to eliminate immunocompetent cells proved effective in reducing the severity and incidence of secondary diseases and in increasing the number of survivors of lethally irradiated semi-isologous mice after transplantation of parental peripheral mononuclear cells. (Author)

**A82-34473** † **Significance of the rehydration rate of the inner ear in the choice of method of surgical intervention in the endolymphatic system in Meniere's disease (Znachenie skorosti regidratatsii vnutrennego ukha v**

**vybore metoda khirurgicheskogo vmeshatel'stva na endolimfaticheskoi sisteme pri bolezni Men'era).** V. T. Pal'chun, V. I. Aslamazova, T. S. Poliakova, and M. I. Kadymova (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* May-June 1982, p. 30-34. 17 refs. In Russian.

**A82-34474 † A caloric vestibular test using air (Kaloricheskaia vestibuliarnaia proba s ispol'zovaniem vozdukha).** Iu. O. Bulaev and V. V. Vishniakov (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* May-June 1982, p. 36-39. 14 refs. In Russian.

A comparative study is presented of the parameters of the nystagmus reaction induced by the use of air and water for the caloric stimulation of the labyrinths. Air calorization was performed using air at temperatures of 24 and 50 C and a flow rate of 4 l/min in healthy subjects along with calorization by the Hallpike method with water at 30 and 44 C. Results of electro-nystagmography indicate the fundamental characteristics of nystagmus during air and water calorization to differ insignificantly although the latent period for air calorization was more prolonged. An asymmetry in labyrinthine excitability is also observed, corresponding to values of 12.1% for water calorization and 22.0% for the procedure using air. It is concluded that air calorization has a potential for wide clinical applications provided certain methodological factors are taken into account. A.L.W.

**A82-34475 † Hormone levels in the blood of patients with Meniere's disease and cochleovestibulopathies (Soderzhanie gormonov v krovi bol'nykh s bolezn'iu Men'era i kokhleovestibulopatiei).** O. A. Buianovskaia, V. V. Potemkin, and G. N. Gudukina (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* May-June 1982, p. 40-44. 16 refs. In Russian.

**A82-34476 † Effects of traumatic shock on cytogenetic processes in the epithelial cells of the cornea and tongue and the bone marrow cells of albino rats (Vliianie travmaticheskogo shoka na tsitogeneticheskie protsessy v kletkakh epiteliia rogovitsy i iazyka i v kletkakh kostnogo mozga belykh krys).** G. M. Kalivetskaia, S. S. Timoshin, A. L. Lykov, and N. B. Murzina (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 92-94. 15 refs. In Russian.

**A82-34477 † Dynamics of changes in the prostaglandin content of the brain tissue under cervical sympathectomy and circulatory hypoxia (Dinamika izmeneniia soderzhaniia prostaglandinov v tkani mozga pri verkhnesheinoi simpatektomii i tsirkuliatornoi gipoksii).** L. V. Govorova, A. G. Kucherenko, Kh. M. Markov, Sh. S. Tashaev, and S. I. Teplov (Leningradskii Neirokhirurgicheskii Institut, Leningrad; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 3-6. 15 refs. In Russian.

**A82-34478 † Features of the reaction of the blood serum of a healthy person with epidermis (Osobennosti reaktsii syvorotki krovi zdorovogo cheloveka s epidermisom).** E. V. Gnezditskaia and L. V. Beletskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 68-70, 123. 14 refs. In Russian.

Indirect immunofluorescence (performed on 70 healthy subjects) has shown that the blood serum of healthy subjects reacts with cytoplasm antigens of epidermis differentiated cells (EDCs) in 100% of the cases. The level of antibodies and the immunomorphological picture of the reaction are characterized by high constancy and intense fluorescence of EDCs, while the reaction with basal layer cell antigens is observed comparatively rarely and is not pronounced. Attention is given to the possible role of antibodies in the blood serum and to the role of their complexes with tissue antigens in the regulation of the vital activity of the cells and the immune response to the host antigens. B.J.

**A82-34479 † Effect of thymalin on the system of cyclic nucleotides in the mouse spleen (Vliianie timalina na sistemu tsiklicheskikh nukleotidov v selezenke myshei).** I. S. Gavrilenko, V. Kh. Khavinson, V. G. Morozov, and Iu. Iu. Ivnitskii (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 39, 40. 8 refs. In Russian.

**A82-34480 † Comparative study of the gas-transport characteristics of models of an extraerythrocytic oxygen carrier (Sravnitel'noe izuchenie gazotransportnykh kharakteristik modelei vneeritrotsitarnogo perenoschika kisloroda).** A. A. Khachatur'ian, E. P. Viazova, M. A. Azhigirova, A. M. Zeinalov, L. F. Fetisova, and G. Ia. Rozenberg (Tsentral'nyi Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 28-30. 9 refs. In Russian.

It is shown that the coupling of the 2,3-DPH functional analog, pyridoxal-5'-phosphate (PP) to hemoglobin (Hb) and its polymer (HbP) makes it possible to obtain an artificial oxygen carrier with gas-transport characteristics similar to those of freshly prepared donor's blood. The coupling of PP to Hb and HbP intensifies their interaction with other physiologically important ligands (H+ and CO2) and changes the pattern of the relation of P50 to the hemoprotein concentration in a solution. B.J.

**A82-34481 † Glyceroaldehyde phosphatedehydrogenase from human muscles in atherosclerosis (Glitseral'degidfosfatdegidrogenaza iz myshts cheloveka pri ateroskleroze).** F. N. Gil'miiarova and N. N. Postnikova (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 26, 27. In Russian.

Glyceroaldehyde phosphatedehydrogenase (GP) was isolated from human skeletal muscles during autopsies on cadavers with atherosclerosis and from cadavers (serving as a control) without this ailment. The crystallized enzyme was found to be electrophoretically homogeneous in polyacrylamide gel. The specific activity of GP was 1.8 + or - 0.2 and 2.7 + or - 0.2 micromol NADN/mg min in the absence and presence of atherosclerosis, respectively. B.J.

**A82-34482 † Lipid peroxidation and retinal damage under stress (Perekisnoe okislenie lipidov i povrezhdenie setchatki pri stresse).** A. A. Shvedova, V. E. Kagan, I. Ia. Kuliev, S. K. Dobrina, L. L. Prilipko, F. Z. Meerson, and Iu. P. Kozlov (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki; Moskovskii Gosudarstvennyi Universitet; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 24-26. 14 refs. In Russian.

It is shown that in rats exposed to emotional and pain stress, the electrical activity of the retina is inhibited as manifested in a decrease of the magnitude of electroretinogram waves. At the same time, lipid-peroxidation products accumulate and the content of the natural antioxidant alpha-tocopherol decreases in the retina. It is found that preliminary administration of synthetic antioxidants (4-methyl-2,6-ditretbutylphenol, OP-6 belonging to the hydroxypyridine series) prevents the accumulation of lipid-peroxidation products and protects the electrical activity of the retina. B.J.

**A82-34483 † Microcirculation and oxygen tension in the rat brain cortex during hemorrhagic shock (Mikrotsirkuliatsiia i napriazhenie kisloroda v kore golovnogo mozga krys pri geomorragicheskom shoke).** V. I. Udovichenko and Iu. M. Shtykhno (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 8, 9. In Russian.

**A82-34484 † Regulation of the functional activity of stem cells which are the precursors of granulomonopoiesis by polypeptide thymic and bone marrow factors (Reguliatsiia funktsional'noi aktivnosti stvolovykh kletok-predshestvennikov granulomonopoeza polipeptidnymi faktorami timusa i kostnogo mozga).** L. V. Filev, V. Kh. Khavinson, and V. G. Morozov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 94, 95. 12 refs. In Russian.

**A82-34485 † The effect of repeated sublethal overheating on cytogenetic processes in the epithelium of the cornea and in bone marrow cells in white rats (Vliianie mnogokratnogo subletal'nogo peregrevaniia na tsitogeneticheskie protsessy v epitelii rogovitsy i kletkakh kostnogo mozga belykh krys).** M. I. Radivoz, S. S. Timoshin, A. P. Baranov, and N. B. Murzina (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 98-100. 10 refs. In Russian.

**A82-34486 † Distribution of nucleolar nucleic acids in Purkinje cells under vestibular stimulation and immobilization of rats (Raspredelenie kolichestv iadryshkovykh nukleinovykh kislot v kletkakh Purkin'e pri vestibuliarnoi stimuliatsii i immobilizatsii krys).** Z. A. Mikeladze (Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR) and V. Ia. Brodskii (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 105-108. 5 refs. In Russian.

**A82-34487 † Ultracytochemical changes in the brain and liver under the influence of low-intensity nonionizing microwave radiation (Ul'tratsitokhimicheskie izmeneniia v golovnom mozge i pecheni pri deistvii neioniziruiushchikh mikrovolnovykh izluchenii maloi intensivnosti).** V. S. Belokrinitskii, L. A. Tomashevskaia, and G. I. Konobeeva (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 112-116. 11 refs. In Russian.

Ultrastructural and metabolic changes in brain and liver cells provoked by repeated exposure to low-intensity nonionizing radiation are investigated. Morphological, histochemical, and biochemical studies were performed on cells from 478 albino rats having undergone daily microwave irradiation at intensities of 50 and 10 microwatt/cm for up to 2 months. Comparisons with intact animals and with animals exposed to simulated altitude and high doses of microwave radiation alter the structural and functional bases for the regulation of metabolic processes; conformational changes in biologically active compounds are induced, thus damaging the fine structures of the cell, and the patterns of energy production are changed, with an uncoupling of mitochondrial oxidative phosphorylation and an increase in glycolysis at the expense of synthesis. Resistance to hypoxia and the effects of higher doses of radiation are also increased. A.L.W.

**A82-34688 † An autoradiographic and electron-microscope experimental study of the effect on wound healing of various Soviet dressings (Avtoradiograficheskoe i elektronnomikroskopicheskoe issledovanie vliianiia nekotorykh otechestvennykh pereviazochnykh materialov na zazhivlenie ran v eksperimente).** G. N. Dudnikova, T. T. Daurova, and I. B. Rozanova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, Apr. 1982, p. 116-118. 7 refs. In Russian.

**A82-34689 † The level of group development as a factor influencing the relation between group size and successfulness (Uroven' razvitiia gruppy kak faktor, vliiaiushchii na vzaimosviaz' ee velichiny i uspeshnosti).** R. S. Nemov and A. Ia. Galvanovskis. *Voprosy Psikhologii,* Mar.-Apr. 1982, p. 103-108. 22 refs. In Russian.

Previous studies have produced contradictory data concerning the relation of group size with group success whether measured in terms of individual contributions, productivity or satisfaction. The present study seeks to explain these contradictions in terms of the influence of the social and psychological development of the group. Evaluations of group development and successfulness according to the three criteria indicated were performed for 38 groups of schoolchildren containing four to seven members each. In groups exhibiting high and moderate levels of development, task efficiency, the average individual contribution and member satisfaction are found to be independent of group size, while in groups with low levels of development and in randomly assembled groups, a statistically significant correlation is obtained between these factors. A.L.W.

**A82-34690 † The direction of the process of computer operator training (Upravlenie protsessom obucheniia operatorov EVM).** I. K. Valovaia. *Voprosy Psikhologii,* Mar.-Apr. 1982, p. 115-121. 7 refs. In Russian.

The psychological characteristics of computer operator activity and the factors influencing the learning of this activity are studied to aid in the direction of the education of computer operators. Experiments were conducted to determine the characteristics of the processing of a standard set of information in which it is necessary to distinguish signals contained in the information under various mental workloads, the characteristics of the improvement in the speed and accuracy of information processing and the changes in the rate of information processing brought about by mental workloads and fatigue in male and female students converting an informational program into punched cards. Results are used to derive a model of the training process which may be used to monitor progress in mastering skills, and predict individual patterns of skill acquisition and the degree of mental fatigue encountered when working with test problems of varying complexity. A.L.W.

**A82-34691 † Test for the study of the efficiency of the tactile-motor analyzer (Test dlia issledovaniia rabotosposobnosti taktil'no-motornogo analizatora).** A. S. Lukauskas, V. B. Obelianis, and Iu. P. Rauba. *Voprosy Psikhologii,* Mar.-Apr. 1982, p. 130-132. In Russian.

A method is presented which allows the assessment of the functional condition of the central nervous system through the measurement of tactile-motor efficiency. The test involves the manual separation of differently textured objects of the same size on the basis of their textures alone without the use of visual clues. Results are tabulated in terms of the time required, the number of errors, and the information processing rate in bits per second. The method is particularly useful in the workplace, and for the evaluation of the visually handicapped. A.L.W.

**A82-34693 † The efficiency of the training of young athletes when vitamins and trace elements are included in their diet (Effektivnost' trenirovki iunykh atletov pri vkliuchenii v ratsion vitaminnykh i mikroelementnykh dobavok).** V. Ia. Rusin, V. V. Nasolodin, and I. P. Gladkikh (Iaroslavskii Gosudarstvennyi Pedagogicheskii Institut; Iaroslavskii Gosudarstvennyi Universitet, Yaroslavl, USSR). *Gigiena i Sanitariia,* Mar. 1982, p. 78-80. 11 refs. In Russian.

**A82-34694 † A hygienic assessment of the possibility of using 1,3-dichloro-5,5-dimethylhydantoin for disinfecting drinking water (Gigienicheskaia otsenka vozmozhnosti primeneniia 1,3-dikhlor-5,5-dimetilgidantoina dlia tselei obezzarazhivaniia pit'evoi vody).** A. A. Semenova and A. A. Korolev (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Gigiena i Sanitariia,* Mar. 1982, p. 11-13. In Russian.

**A82-34695 † Space biology and medicine (Kosmicheskaia biologiia i meditsina).** E. I. Vorob'ev (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR) and A. R. Kotovskaia. *Zemlia i Vselennaia,* Mar.-Apr. 1982, p. 32-35. In Russian.

Activities in the fields of space biology and medicine conducted within the framework of the Intercosmos program are discussed. Early experiments conducted to demonstrate the possibility of surviving in a weightless environment are indicated, and the results of biological experiments flown on Cosmos biosatellites are outlined which demonstrated the effects of weightlessness on muscular and bone tissues and the possibility of counteracting these effects by the use of centrifuge-generated artificial gravity. Medical experiments performed during nine international manned space flights are then discussed with particular attention given to devices used in studies of the cardiovascular and respiratory systems, auditory and gustatory perception, the prevention of changes in leg muscular and supportive functions, motion sickness drugs, psychological effects, mental work capacity and the prevention of mood deterioration during the acute phase of adaptation to space flight conditions. A.L.W.

**A82-34696 † The organism and magnetic fields (Organizm i magnitnye polia).** Iu. A. Kholodov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 13, Apr.-June 1982, p. 48-64. 117 refs. In Russian.

Current knowledge concerning the biological effects and generation of magnetic fields is reviewed. Following a classification of magnetocybernetics, into the areas of magnetobiology, biomagnetism and the magnetic control of biosystems, the biotropic parameters of magnetic fields are examined, with particular attention given to induction, gradient, vector, frequency, pulse shape, exposure and localization. Characteristics of the organism affecting its reponse to a magnetic field, including age, sex, individual differences, and the tissues affected, are considered, and the temporal characteristics, localization and actual nature of the reaction of an organism to a magnetic field are examined, with particular attention given to the general readjustment reaction and the slow initial reaction. Data from the recording of the magnetic fields of the human heart and brain is also presented, and possible physical and chemical mechanisms for the biological effects of magnetic fields are discussed. A.L.W.

**A82-34697 † The nervous regulation of the liquid state of the blood and its coagulation (Nervnaia reguliatsiia zhidkogo sostoianii krovi i ee svertyvaniia).** T. M. Kalishevskaia and M. G. Golubeva (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 13, Apr.-June 1982, p. 93-122. 160 refs. In Russian.

The paper reviews the current state of knowledge concerning the neurohumoral regulation of blood coagulation and the maintenance of the blood in a liquid state in the whole organism. The classical enzymatic theory of blood coagulation is outlined, however it is noted that the sequence of biochemical reactions identified with the coagulation process does not take into account the influence of the organism itself. The nature and functioning of blood anticoagulants in the regulation of the liquid state of the blood is then examined, and vascular bed chemoreception is discussed as the fundamental physiological mechanism controlling the blood coagulant and anticoagulant systems according to thrombin and plasmin levels. Experimental data concerning the role of central brain structures and the sympathetic and parasympathetic nervous systems in the regulation of the blood coagulation system is then discussed with particular emphasis on the role of the hypothalamus as the locus of the interaction of regulatory mechanisms. A.L.W.

**A82-34698 † The prognostic value of the glucose tolerance test (Prognosticheskoe znachenie proby na tolerantnost' k gliukoze).** V. G. Baranov, A. M. Sitnikova, and L. I. Konradi (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kazanskii Meditsinskii Zhurnal,* vol. 63, Jan.-Feb. 1982, p. 18, 19. 7 refs. In Russian.

Characteristics of a normal glucose tolerance test most predictive of the future development of diabetes mellitus and other disturbances in glucose tolerance were studied on the basis of a retrospective study of 564 women with initially normal glucose tolerance. Comparison of the results of a second glucose tolerance test conducted 2 months to 16 years following a first test with those of the first reveals 33.8% of the subjects to have developed disturbances in glucose tolerance (25.7% of the questionable type and 8.1% of the diabetic type). Analysis of the results of the first examination of the three groups identified reveals that, while all values of blood glucose levels were within the normal range, those observed subsequently to have impaired tolerances tended to exhibit higher levels following glucose loading in the first test. It is concluded that glycemias of 7.8 to 9.9 mmole/l 1 hour following glucose loading and 6.1 to 7.2 mmole/l 2 hours after loading are each indicative of an increased risk of diabetes mellitus. A.L.W.

**A82-34768 The effect of millimeter-wave electromagnetic radiation on biological structures and organisms of varying complexity (Vozdeistvie elektromagnitnykh kolebanii millimetrovogo diapazona dlin voln na biologicheskie struktury i organizmy razlichnoi slozhnosti).** N. D. Deviatkov, O. V. Betskii, E. A. Gel'vich, M. B. Golant, T. B. Rebrova, L. A. Sevast'ianova, and A. Z. Smolianskaia (Akademiia Nauk SSSR, Institut Radiotekhniki i Elektroniki, Moscow, USSR). In: Electromagnetic compatibility 1980; Proceedings of the Fifth International Wroclaw Symposium and Exhibition, Wroclaw, Poland, September 17-19, 1980. Part 2. Wroclaw, Wydawnictwo Politechniki Wroclawskiej, 1980, p. 561-570. 15 refs. In Russian.

The paper examines the main features of the effect of millimeter-wave radiation on biological objects at the molecular, cellular, and organism level. The dependence of the interaction on irradiation time and on the irradiation power density is investigated for the following biological objects: hemoglobin and erythrocytes in human blood, the E. coli bacillus, golden staphylococcus, mold and fungus, and mice and rats. Millimeter-wave radiation is found to have a powerful resonant effect on the development and activity of biological objects; this effect is observed at various frequencies with an irradiation power density of several mW/sq cm. B.J.

**A82-34830 Reconstruction of spatial information in the human visual system.** G. Nyman and P. Laurinen (Helsinki, University, Helsinki, Finland). *Nature*, vol. 297, May 27, 1982, p. 324, 325. 9 refs.

In the considered psychophysical context, the term 'reconstruct' refers to the observer's ability to perceive certain predetermined spatial features, such as waveform or spatial frequency, in a stimulus consisting of spatial samples of a grating of particular waveform and spatial frequency. Psychophysical measurements were conducted regarding the number of samples per spatial cycle needed to recognize sinusoidal and square-wave gratings. The obtained results are expressed in terms of sampling efficiency, which relates the measured threshold sampling rate to the Shannon-Whittaker or Nyquist limit of the grating frequency which was studied. The results contradict the models which describe the visual system as a Fourier analyzer in which a complex waveform is recognized on the basis of the information obtained from its harmonics, each of which is channelled through its own spatial frequency selective channel. G.R.

**A82-34831 Local cerebral glucose utilization in non-rapid eye movement sleep.** C. Kennedy (U.S. Public Health Service, Laboratory for Cerebral Metabolism, Bethesda, MD; Georgetown University, Washington, DC), J. C. Gillin, W. Mendelson, S. Suda, M. Miyaoka, M. Ito, R. K. Nakamura, F. I. Storch, K. Pettigrew, and M. Mishkin (U.S. Public Health Service, Department of Health and Human Services, Bethesda, MD). *Nature*, vol. 297, May 27, 1982, p. 325-327. 9 refs.

Sleep is accompanied by alterations in neurophysiological activity in many discrete regions in the brain. Such alterations could be expected to be accompanied by corresponding changes in local metabolic rate. The specific regions involved in sleep, at least in the stages other than rapid eye movement (REM) sleep, have now been searched for by using the (2-(C-14)) deoxyglucose method for measuring local cerebral glucose utilization in the rhesus monkey. Contrary to what many have predicted, animals during stages 2-4 of sleep exhibited a nonselective, generalized 30% decrease in cerebral metabolic rate. Of the 75 structures measured, none exhibited a higher rate in non-REM sleep than in wakefulness. (Author)

**A82-34834 A computational model of binocular depth perception.** J. E. W. Mayhew (Sheffield, University, Sheffield, England) and H. C. Longuet-Higgins (Sussex, University, Brighton, England). *Nature*, vol. 297, June 3, 1982, p. 376-378. 14 refs.

It is pointed out that the horizontal disparities between a pair of retinal images are inadequate for computing the three-dimensional structure of a scene unless supplemented by independent information about the distance and direction of the fixation point. It is suggested that this supplementary information is derived not from nonvisual sources, but from the vertical disparities of a few nonmeridional image points. This hypothesis is shown to account quantitatively for Ogle's induced effect - the marked distortion of a scene by a vertically magnifying lens placed in front of one eye. (Author)

**A82-34917 † Magnetic-field effect on photophysical processes in the light-harvesting pigment apparatus of purple photosynthetic bacteria (Vliianie magnitnogo polia na fotofizicheskie protsessy v svetosobiraiushchem pigmentnom apparate purpurnykh fotosinteziruiushchikh bakterii).** E. I. Elfimov, V. M. Vozniak, and I. R. Prokhorenko (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 264, no. 1, 1982, p. 248-252. 15 refs. In Russian.

# STAR ENTRIES

**N82-24258#** Joint Publications Research Service, Arlington, Va.
**PSYCHOLOGICAL ASPECTS OF AEROSPACE ORIENTATION**
Avn G. Beregovoy *In its* USSR Rept.: Space, No. 15 (JPRS-80424) 29 Mar. 1982 p 45-49 Transl. into ENGLISH from Aviats. Kosmonavt. (USSR), no. 10, Oct. 1981 p 34-35

Avail: NTIS HC A07/MF A01

The practical experience of cosmonauts on the ground and analysis of their activities during space flight is discussed. It is evidenced that control accuracy and precision in decision making by spacecraft commanders, especially in nonprogrammed situations, depend to a great extent on their experience as a pilot. Piloting a space vehicle has features which are peculiar to it alone. Nonetheless, the differences between space flight and the flight of an aircraft in the atmosphere seem fundamental only at first glance. It is concluded that spacecraft flight and aircraft flight have quite a lot in common, primarily as related to spatial orientation in the atmosphere and in space. E.A.K.

**N82-24806** Joint Publications Research Service, Arlington, Va.
**USSR REPORT. LIFE SCIENCES: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 14**
28 Jan. 1982 89 p refs Transl. into ENGLISH from various Russian articles
(JPRS-79973) Copyright. Avail: Issuing Activity

Changes in central nervous system cells caused by the reproduction of arboviruses, pigskin grafts for burn treatment, the role of aviation physicians, the use of magnetic fields in biology and medicine, and cellular processes observed in the recovery from acute radiation sickness are discussed.

**N82-24807** Joint Publications Research Service, Arlington, Va.
**ULTRASTRUCTURAL CHANGES IN CENTRAL NERVOUS SYSTEM CELLS INDUCED BY ARBOVIRUSES**
B. A. Yerman and N. Ya. Pashnina *In its* USSR Rept. Life Sci.: Biomed. and Behavioral Sci., No. 14 (JPRS-79973) 28 Jan. 1982 p 1-11 refs Transl. into ENGLISH from Arkh. Patol. (USSR), v. 43, no. 9, Sep. 1981 p 72-78

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Changes observed in animal central nervous system cells due to the reproduction of tick-borne encephalitis arboviruses are described. The disappearance of the rough endoplasmic reticulum, cellular ribosomes, and polysomes in nerve and glial cells, and hyperplasia and hypertrophy of the smooth membranes of the lamellar complex and endoplasmic reticulum with dilatation of cisternae and canals was observed. The grouping of smooth membranes and the appearance on the membranes of nucleoid centers are characteristic. The appearance of vesicles in the cytoplasmic matrix and cisternae of endoplasmic reticulum was observed. Sites where mature virions and alphavirus and flavivirus nucleoids are located and identified. Other changes typical for each pathogen are described. J.D.

**N82-24808** Joint Publications Research Service, Arlington, Va.
**PIGSKIN XENOGRAFTS IN TREATMENT OF PATIENTS WITH EXTENSIVE BURNS**
V. K. Sologub, M. I. Dolgina, D. A. Donetskiy, S. S. Morozov, V. G. Borisov, Z. G. Goncharova, and G. G. Serov *In its* USSR Rept. Life Sci.: Biomed. and Behavioral Sci., No. 14 (JPRS-79973) 28 Jan. 1982 p 36-39 refs Transl. into ENGLISH from Khirurgiya (Moscow), no. 5, May 1980 p 14-16

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The use of pigskin xenografts for the treatment of severe burns is evaluated. Clinical observations of the treatment of 60 patients having deep burns over 10 to 70% of their bodies are described. The burns were covered with preserved skin grafts of both allogenic and xenogenic origin. An improvement in neurological and psychological status, the reduction of heat, water, protein, and electrolyte losses, and the prevention of anemia and of microfloral invasion of the wound and were observed. J.D.

**N82-24809** Joint Publications Research Service, Arlington, Va.
**SUPPORT ROLE OF AVIATION PHYSICIANS**
I. Alpatov *In its* USSR Rept. Life Sci.: Biomed. and Behavioral Sci., No. 14 (JPRS-79973) 28 Jan. 1982 p 40-42 Transl. into ENGLISH from Grazhdanskaya Aviats. (Moscow), no. 6, Jun. 1981 p 24
Copyright. Avail: Issuing Activity

The changing role of aviation physicians in maintaining and evaluating the health of flight personnel is discussed, with particular emphasis on the sociopsychological aspects of health care. J.D.

**N82-24810** Joint Publications Research Service, Arlington, Va.
**BIOTROPIC PARAMETERS OF MAGNETIC FIELDS**
M. A. Shishlo *In its* USSR Rept. Life Sci.: Biomed. and Behavioral Sci., No. 14 (JPRS-79973) 28 Jan. 1982 p 47-50 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lecheb. Fiz. Kult. (Moscow), no. 3, May - Jun. 1981 p 61-63

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The use of magnetic fields in biology and medicine for the control of biological systems is discussed. Biotropic parameters of magnetic fields, including intensity, gradient, vector, pulse frequency and shape, and duration of exposure are described. Units of measurement are given, and terminology is discussed. J.D.

**N82-24811** Joint Publications Research Service, Arlington, Va.
**POSTRADIATION RECOVERY OF HUMAN BONE MARROW AND MORPHOLOGICAL DYNAMICS OF UNDIFFERENTIATED CELL POOL**
L. A. Suvorova, N. A. Vyalova, A. V. Barabanova, and G. P. Gruzdev *In its* USSR Rept. Life Sci.: Biomed. and Behavioral Sci., No. 14 (JPRS-79973) 28 Jan. 1982 p 55-62 refs Transl. into ENGLISH from Terapevt. Arkh. (Moscow), v. 53, no. 9, Sep. 1981 p 127-131

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The postradiation repair of the hemopoietic function in human beings and of changes observed in bone marrow and peripheral blood is described. The processes of damage and recovery of bone marrow from acute radiation sickness induced by external radiation are described, based on observations of 77 samples made from the first to the forty-third day after irradiation. J.D.

**N82-24812*#** California Univ., Irvine. Dept. of Development and Cell Biology.
**DEVELOPMENT OF GUAYULE (PARTHENIUM ARGENTATUM) Final Report**
Ernest A. Ball 2 Jan. 1981 14 p refs
(Contracts NAS7-100; JPL-954955)
(NASA-CR-168926; JPL-9950-477; NAS 1.26:168926; UCI-59913) Avail: NTIS HC A02/MF A01 CSCL 06C

The cytokinin benzylaminopurine strongly stimulated shoot growth, and the number of regenerated buds on the inoculum was proportional to its concentration. These buds produced shoots several centimeters in length which were caused to root on medium containing indolebutyric acid. Transferred to the septic condition of soil, the plantlets were gradually brought into full sunlight where they showed a brief vegetative growth with production of mature type leaves, and flowered. In contrast, seedlings of the same age remained vegetative. Chromosome studies of root smears from the tissue cultured plantlets showed that 2n = 36, the normal number for sexually reproducing guayules. Author

**N82-24813#** Committee on Science and Technology (U. S. House).
**THE USE OF ANIMALS IN MEDICAL RESEARCH AND TESTING**
Washington GPO 1982 752 p refs Hearings before the Subcomm. on Sci., Res. and Technol. of the Comm. on Sci. and Technol., 97th Congr., 1st Sess., No. 68, 13-14 Oct. 1981

(GPO-87-598) Avail: Subcommittee on Science, Research and Technology

The use of animals in medical research is discussed. Abundant evidence is cited for the view that the research involving animals is beneficial for humans. Other evidence is presented that supports the view that alternative research methods could be employed. Criticism is aimed at the poor care that the animals receive and at the unnecessary suffering they experience. The ethics and morals of animal experimentation are considered. The text of House Resolution 556, a pending bill calling for the establishment of a national center for alternative research is given. R.J.F.

**N82-24814#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**EVALUATION OF IMMUNOLOGICAL METHODS FOR TOXICITY STUDIES IN ANIMALS: INHALATION STUDIES WITH BENZENE AND HALOTHANE IN RATS**

L. M. Appelman (Inst. Toxicology and Nutrition, Utrecht), O. Brocades Zaalberg, J. L. F. Gerbrandy, Frieke Kuper, and D. deRijke (Inst. Toxicology and Nutrition, Utrecht) Mar. 1980 127 p refs

(MBL-1980-4; CIVO-R-6506; TDCK-75132) Avail: NTIS HC A07/MF A01

The sensitivity of the immune system as a criterion for detecting harmfulness of inhaled substances was investigated. Immunological and toxicological data from tests in which rats were exposed to benzene and halothane for six weeks are recorded.

**N82-24815#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**INHALATION STUDIES WITH BENZENE IN RATS. PART A: TOXICOLOGICAL DATA**

L. M. Appelman, C. F. Kuper, and D. deRijke *In its* Evaluation of Immunol. Methods for Toxicity Studies in Animals: Inhalation Studies with Benzene and Halothane in Rats Mar. 1980 73 p refs

Avail: NTIS HC A07/MF A01

Subchronic benzene inhalation toxicity was studied by exposing groups of 15 male and 15 female rats to atmospheres containing 0, 25, 250 or 1250 ppm benzene, 6 hr a day, 5 days a week, for 13 weeks. Five males and five females of each group were killed after 6 weeks for interim pathological examination. Two groups of female rats were exposed to 0 or 250 ppm benzene for a period of 6 weeks. Examination shows that benzene concentrations of 1250 or 250 ppm in the atmosphere can induce lymphopenia accompanied by reduced thymus and spleen weights. The no-toxic-effect level of benzene in rats is 25 ppm. Author (ESA)

**N82-24816#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**INHALATION STUDIES WITH BENZENE IN RATS. PART B: IMMUNOLOGICAL DATA**

O. Brocades Zaalberg and J. L. F. Gerbrandy *In its* Evaluation of Immunol. Methods for Toxicity Studies in Animals: Inhalation Studies with Benzene and Halothane in Rats Mar. 1980 26 p refs

Avail: NTIS HC A07/MF A01

Subchronic benzene inhalation toxicity was studied. In experiments (1) and (2), male and female rats were exposed to 0, 25, 250, and 1250 ppm benzene vapor for 6 hr a day, 5 days a week for 13 weeks. In experiment (3), female rats were exposed to 250 ppm for 6 weeks. Primary antibody formation against sheep red blood cells (SRBC) in (1) varies too much to justify conclusions about a benzene effect. The antibody response to SRBC by the test rats in (3) is the same as that of the controls. Mitogen stimulation of spleen cells and peripheral blood cells shows a linear log benzene dose effect relation with phytohemagglutinin (PHA) stimulated male and female spleen cells in (1), and with PHA, Concanavalin A or PWM stimulated peripheral blood cells in (2). In (3), a significant reduction in PHA stimulation of peripheral blood cells from test rats is observed. Author (ESA)

**N82-24817#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**INHALATION STUDIES WITH HALOTHANE IN FEMALE RATS. PART A: TOXICOLOGICAL DATA**

L. M. Appelman and C. F. Kuper *In its* Evaluation of Immunol. Methods for Toxicity Studies in Animals: Inhalation Studies with Benzene and Halothane in Rats Mar. 1980 17 p refs

Avail: NTIS HC A07/MF A01

Halothane inhalation toxicity was studied by exposing female rats for 6 hr a day, 5 days a week to atmospheres containing 0 or 2500 ppm halothane, for 6 weeks. Mean concentration of the test compound in the atmosphere was 2506 ppm. Inhalation causes growth retardation lymphopenia and slight anemia. More urine of lower density and containing more ketones is produced. Lower glucose and higher urea nitrogen levels in the blood are observed. Higher serum alkaline phosphatase activity is noted. Higher relative liver and kidney weights and a lower relative spleen weight are recorded. Author (ESA)

**N82-24818#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**INHALATION STUDY WITH HALOTHANE IN FEMALE RATS. PART B: IMMUNOLOGICAL DATA**

O. Brocades Zaalberg and J. L. F. Gerbrandy *In its* Evaluation of Immunol. Methods for Toxicity Studies in Animals: Inhalation Studies with Benzene and Halothane in Rats Mar. 1980 10 p refs

Avail: NTIS HC A07/MF A01

The effect of exposure to halothane vapor on immunological parameters was studied by exposing female rats to 2500 ppm halothane a day, 5 days a week for 6 weeks. No effect on the primary antibody response to sheep erythrocytes is observed. The secondary antibody response to tetanus toxoid is slightly, but not significantly, lowered as is the delayed hypersensitivity reaction to tuberculin. The local antibody production to tetanus toxoid in the lung is not changed. The transformation reaction of peripheral blood lymphocytes with phytohemagglutinin or concanavalin A is slightly, but not significantly reduced. Author (ESA)

**N82-24819#** Joint Publications Research Service, Arlington, Va.

**USSR REPORT. LIFE SCIENCES: EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 5**

8 Apr. 1982 18 p refs Transl. into ENGLISH from various Russian articles

(JPRS-80525) Copyright. Avail: NTIS HC A02/MF A01

The biological effects of magnetic fields are reported. The cerebral cortex of rats was studied. Metabolic changes in rats are reported. Ion metabolism in blood and myocardium of rats and guinea pigs was also investigated.

**N82-24820#** Joint Publications Research Service, Arlington, Va.

**PATHOMORPHOLOGICAL REACTIONS OF CEREBROCORTICAL NEURAL ELEMENTS TO ALTERNATING MAGNETIC FIELD**

I. V. Toroptsev and L. P. Soldatova *In its* USSR Rept. Life Sci.: Effects of Nonionizing Electromagnetic Radiation, No. 5 (JPRS-80525) 8 Apr. 1982 p 1-4 refs Transl. into ENGLISH from Arkh. Patol. (Moscow), v. 43, No. 11, Nov. 1981 p 33-36

Copyright. Avail: NTIS HC A02/MF A01

The cerebral cortex was studied as a model highly sensitive to magnetic fields. Significant disturbances in the water-electrolyte balance, manifested as hydropic changes in the walls of cortical capillaries, nerve cells and their derivatives were discovered. A horseshoe electromagnet with trapezoidal tips at the poles was used to create an alternating magnetic field with a frequency of 50 Hz, which deviated by no more than 5 percent over the entire area of the magnet at a field intensity of 20 mT. The field gradient was 0.1 mT/cm. Intensity pulsation was 1.8 percent. One-time total exposures lasting 6.5 hours were employed. The experiments were run in winter on 136 male rats weighing 190-210 gm. The animals (three specimens in each experiment) were maintained unrestrained in a nonmagnetic cage which limited mobility somewhat. They were killed by decapitation after 1, 6, 12 and 24 hours and 3, 5, 7, 14, 21 and 28 days following exposure. Portions of the parietal, posterior frontal and limbic cortex were sampled as morphological equivalents of, correspondingly, the sensomtor, kinesthetic and motor analyzers and the analyzer of the internal environment. Author

**N82-24821#** Joint Publications Research Service, Arlington, Va.

**METABOLIC CHANGES IN EXPERIMENTAL ANIMALS AS INDICATORS OF BIOLOGICAL EFFECTS OF 50 Hz**

### ELECTROMAGNETIC FIELDS

L. A. Tomashevskaya and Yu. D. Dumenskiy *In its* USSR Rept. Life Sci.: Effects of Nonionizing Electromagnetic Radiation, No. 5 (JPRS-80525) 8 Apr. 1982 p 5-8 refs Transl. into ENGLISH from Vrachebnoye Delo (Kiev), no. 7, Jul. 1981 p 98-100
Copyright. Avail: NTIS HC A02/MF A01

The biological effects of commercial frequency (CF) electromagnetic fields (EMF) as a function of intensity and time of exposure to the field are discussed. Conditions proceeding from those that actually prevail in areas where high-voltage lines pass were simulated. A chronic experiment was conucted on white rats (180 specimens) divided into groups according to intensity (E-10, 15, 20 kV/m) and modes of exposure to CF EMF (4 and 16 times a day, 5 min per session, to a total of 20 and 80 min). Biochemical processes were evaluated according to different types of metabolism participating in the body's response to CF EMF. For this purpose, we assayed urea and residual nitrogen in blood serum, blood glucose, liver glycogen, adrenal ascorbic acid, cholinesterase activity, ceruloplasmin content and saturation with transferring iron of blood serum. Studies were conducted during exposure to the field for 4 months, as well as in the aftereffect period. Author

**N82-24822#** Joint Publications Research Service, Arlington, Va.

### EFFECTS OF EXPERIMENTAL STATIONARY MAGNETIC FIELD ON METABOLISM OF SOME IONS IN BLOOD AND MYOCARDIUM

D. D. Tvildiani, T. I. Chiaidze, N. V. Dolidze, L. N. Golashvili, and V. A. Chikhladze *In its* USSR Rept. Life Sci.: Effects of Nonionizing Electromagnetic Radiation, No. 5 (JPRS-80525) 8 Apr. 1982 p 8-11 refs Transl. into ENGLISH from Soobshch. Akad. Nauk Gruz. SSR (USSR), v. 101, no. 1, Jan. 1981 p 169-172
Copyright. Avail: NTIS HC A02/MF A01

The effects of a stationary magnetic field (SMF) on EKG parameters and ion (Na, K, Ca, Mg) metabolism in blood serum and myocardial homogenate were studied. The study was conducted on 30 rabbits and 30 guinea pigs. Three-hour exposure of rabbits to SMF elicited a shift of the S-T segment on the EKG, depression of T wave, change in amplitudes of R and S waves in different directions, and after 24 and 48 h a drop of general volage as well. Thirteen out of fifteen healthy rabbits expired on the 2nd or 3rd day after the last exposure to SMF. Conclusions are presented. N.W.

**N82-24823#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

### TORSO EXPERIENCED AERODYNAMIC FORCES EXPERIENCED DURING EJECTION

Arthur J. Nestle Feb. 1981 48 p refs
(AD-A098942; AFAMRL-TR-80-20) Avail: NTIS HC A04/MF A01 CSCL 06/19

The forces are momentarily unique in direction and can be of severe magnitude. One difficulty of analyzing extremity injury during emergency escape is the diversity and intensity of the aerodynamic environment the human torso experiences entering free stream flow. Aerodynamically, an appreciation of these forces, which can be resolved into positive and negative pressure locally, can be achieved from correlation of the relative likeness of anatomical segments to investigated geometric shapes (i.e., spheres, cylinders, etc.). Aerodynamic data were obtained from tests using modelled crewmembers in a five foot wind tunnel and coefficients of pressure calculated from manometer readings. These coefficients were determined for crewmember location and pitch, and yaw of trim of the aircraft from -10 to +10 degrees each, and were graphically analyzed using three dimensional computer plots. Severity, gross kinetic changes, and points of force application are described. T.M.

**N82-24824#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

### PROBLEMS IN THE THERAPY OF SOMAN POISONING

O. L. Wolthuis, F. Berends, and E. Meeter Apr. 1981 27 p refs
(Contract A79/K/032)
(MBL-1981-1; TDCK-75106) Avail: NTIS HC A03/MF A01

The lack of efficacy of combined therapies, involving a cholinolytic drug and an oxime, is reviewed. Problems include rapid aging of the phosphylated acetylcholinesterase, poor reactivation of nonaged inhibited enzymes (oxime resistancy), and the predominant effect of soman on the central nervous system. Species differences and the persistence of soman in depots complicate treatment. Reactivation of only a few percent of the total amount of functional cholinesterase can save life, so enzyme aging is not serious. Oxime resistance is overcome by oximes which effectively penetrate the blood brain barrier. These oximes also have antidotal effects not based on enzyme reactivation. Author (ESA)

**N82-24825#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.

### EFFECTS OF IMPULSE NOISE ON HUMAN BEINGS: A PILOT STUDY ON ANNOYANCE RATINGS IN THE LABORATORY

G. F. Smoorenburg and W. H. deVries May 1981 53 p refs
(IZF-1981-9; TDCK-75523) Avail: NTIS HC A04/MF A01

Annoyance ratings for traffic, gunfire, pile driving and white noise were recorded by young male adults on a numerical scale. The noises were presented at 49, 56, 63, and 70 dbA for 5 min. Results show no significant differences in ratings for the noises, but when results are combined with those of other researchers, significant interaction between the effects of different levels and of different noises is found. At 63 dbA, ratings for traffic, gunfire and pile driving noise are about the same, but at 49 dbA gunfire and pile driving noise are rated more annoying than traffic noise. The white noise bursts are rated higher than gunfire and pile driving noise. Author (ESA)

**N82-24826#** Washington Univ., Seattle. Dept. of Psychology.

### INDIVIDUAL DIFFERENCES IN DUAL TASK PERFORMANCE Final Report, 1 Apr. 1977 - 31 Mar. 1980

Marcy Lansman and Earl Hunt 10 Jun. 1981 35 p refs
(Contract N00014-77-C-0225)
(AD-A110768) Avail: NTIS HC A03/MF A01 CSCL 05/10

The topic of the research was individual differences in dual task performance. It addressed the basic question: Is performance on multi-component tasks predicted by performance on the individual components performed separately? In the first series of experiments, we used a dual task involving memory and verbal processing components to predict a psychometric measure of verbal ability. Single and dual task performance were found to be highly correlated. The two types of measures predicted performance on the criterion verbal ability measure equally well. GRA

**N82-24827#** Illinois Univ., Champaign. Cognitive Psychophysiology Lab.

### THE EVENT RELATED BRAIN POTENTIAL AS AN INDEX OF INFORMATION PROCESSING, COGNITIVE ACTIVITY, AND SKILL ACQUISITION: A PROGRAM BASIC RESEARCH Annual Report

Emanuel Donchin and Christopher Wickens Nov. 1981 62 p refs
(Contract F49620-79-C-0233; AF Proj. 2313)
(AD-A111057; CPL81-1/AFO; SR81-1; AFOSR-82-0042TR)
Avail: NTIS HC A04/MF A01 CSCL 05/10

This report describes experiments and developments related to six basic categories of research on the event-related brain potential, performance, and cognition: (1) Tracking, attention, and workload; (2) automation, skill learning, memory, and the 'depth' of information processing; (3) individual differences; (4) mental chronometry; (5) other components of the ERP than P300; and (6) methodologies and analytical techniques. GRA

**N82-24828#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Traffic Behavior Group.

### A RATIONALE FOR THE DEVELOPMENT OF CUT-OFF SCORES

I. H. Veling Feb. 1981 19 p refs
(IZF-1981-3; TDCK-75517) Avail: NTIS HC A02/MF A01

How many response errors a subject is allowed before being defined as a nonmaster is considered. A model which defines the probability that masters and nonmasters respond correctly to an item, and that an individual is a master of that item, is presented. Cut-off scores must be greater than or equal to the test score of the X percent point of the binomial distribution with parameters M and m sub j (j = 1, 2,..., M), where X is a value close to zero, M is a set of bivalued items scored 1 whenever

an item is answered correctly and j is an item. The model correctly determines the cut-off score in a traffic knowledge test.
Author (ESA)

**N82-24829#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group.
**STRESS, INFORMATION PROCESSING AND DIVING**
P. G. A. M. Jorna Apr. 1981 27 p refs
(Contract A79/KM/030)
(IZF-1981-4; TDCK-75518) Avail: NTIS HC A03/MF A01

The influence of experience on diver performance was investigated. Divers selected target letters from a series auditorily presented with 2 second intervals. Additional selective counting of these letters was required. Test dives were made at three periods in a training course, and performance was compared with an experienced group. Performance improves with training. Information selection is not influenced by experience, but the use of this information is less optimal for inexperienced divers. Physiological measures (heart rate, 0.10 Hz component, respiration) show a decreased response to the environment as training processes. Experienced divers show stable responses to being underwater.
Author (ESA)

**N82-24830#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group.
**DISTRACTION IN VISUAL SEARCH**
A. H. Wertheim Jun. 1981 17 p refs
(Contract A78/KL/081)
(IZF-1981-7; TDCK-75522) Avail: NTIS HC A02/MF A01

The search time lengthening effect of distractor stimuli in a visual search task, e.g., spotting ground targets from the air, was studied. Subjects sought target light spots on a screen with pseudorandomly distributed distractors. Six distracting stimuli within a field of 600 nontarget stimuli lengthen search time by 2.5 sec. When the number of distractor stimuli increases, this distraction effect changes into a search time shortening effect. Distraction is not related to the brightness or color qualities of nontarget stimuli. Distraction is affected by the foreground-background configuration of the visual field. This configuration depends on the expectancy of the observer with respect to the nature of the target.
Author (ESA)

**N82-24831#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Vision Group.
**RECOGNITION EXPERIMENTS WITH THERMAL IMAGES. PART 4: EFFECT OF SIGNAL TO NOISE RATIO**
S. Mangouri and A. vanMeeteren Jun. 1981 14 p refs
(Contract A76/KL/080)
(IZF-1981-8; TDCK-75520) Avail: NTIS HC A02/MF A01

The effect of pictorial noise on the recognition of thermal images of military vehicles was studied. Thermographs were displayed indoors in a simulation, using a flying spot scanner with variable scan line density and variable amounts of noise added electronically in the scanning circuit. In each session, 69 pictures were presented in random order with the same scan line density and the same signal to noise ratio. Subjects were asked to identify the vehicles from 6 alternatives. Practically no effect is found for signal to noise ratios (per pixel, per 0.1 sec) higher than 20, while there is only moderate decay when the ratio is reduced to 5. This decay is approximately the same over the investigated range of scan line densities. Author (ESA)

**N82-24832#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group.
**SEARCH TIMES IN TWO-DIMENSIONAL TABLES**
W. A. Wagenaar and J. M. A. Fokkens Jul. 1981 8 p
(IZF-1981-10; TDCK-75524) Avail: NTIS HC A02/MF A01

The relation between search time in two-dimensional tables, e.g., timetables, and the number of rows/columns and alphabetical ordering was investigated. Subjects compared the table entry for a target with the digit typed beside the table. Results show that search time can be predicted from a weighted summation of the number of rows and columns. The weights are 230 msec for randomly ordered rows/columns, and 130 msec when rows or columns are alphabetized.
Author (ESA)

**N82-24833*#** Purdue Univ., Lafayette, Ind. Dept. of Foods and Nutrition.
**PLANT DIVERSITY TO SUPPORT HUMANS IN A CELSS GROUND BASED DEMONSTRATOR Final Report, 1 Jul. 1979 - 1 Oct. 1981**
J. M. Howe and J. E. Hoff 1 Oct. 1981 49 p refs
(Grant NsG-2401)
(NASA-CR-168918; NAS 1.26:168918) Avail: NTIS HC A03/MF A01 CSCL 06K

A controlled ecological life support system (CELSS) for human habitation in preparation for future long duration space flights is considered. The success of such a system depends upon the feasibility of revitalization of food resources and the human nutritional needs which are to be met by these food resources. Edible higher plants are prime candidates for the photoautotrophic components of this system if nutritionally adequate diets can be derived from these plant sources to support humans. Human nutritional requirements information based on current knowledge are developed for inhabitants envisioned in the CELSS ground based demonstrator. Groups of plant products that can provide the nutrients are identified.
T.M.

**N82-24834*#** Wisconsin Univ., Madison. Dept. of Horticulture.
**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM: USE OF HIGHER PLANTS**
T. W. Tibbits and D. K. Alford (Metropolitan State Coll.) May 1982 86 p refs Proc. of NASA, Workshop held at Chicago, Nov. 1979 and at Moffett Field, Calif., Mar. 1980
(Grant NsG-2405)
(NASA-CP-2231; NAS 1.55:2231) Avail: NTIS HC A05/MF A01 CSCL 06K

Results of two workshops concerning the use of higher plants in Controlled Ecological Life Support Systems (CELSS) are summarized. Criteria for plant selection were identified from these categories: food production, nutrition, oxygen production and carbon dioxide utilization, water recycling, waste recycling, and other morphological and physiological considerations. Types of plant species suitable for use in CELSS, growing procedures, and research priorities were recommended. Also included are productivity values for selected plant species.
Author

**N82-24835*#** Metrics, Inc., Atlanta, Ga.
**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM: RESEARCH AND DEVELOPMENT GUIDELINES**
Robert M. Mason, ed. and John L. Carden, ed. (Georgia Inst. of Technology) May 1982 99 p refs Proceedings of NASA Workshop held at Moffett Field, Calif., 9-12, 1979
(Grant NsG-2323)
(NASA-CP-2232; NAS 1.55:2323) Avail: NTIS HC A05/MF A01 CSCL 06K

Results of a workshop designed to provide a base for initiating a program of research and development of controlled ecological life support systems (CELSS) are summarized. Included are an evaluation of a ground based manned demonstration as a milestone in CELSS development, and a discussion of development requirements for a successful ground based CELSS demonstration. Research recommendations are presented concerning the following topics: nutrition and food processing, food production, waste processing, systems engineering and modelling, and ecology-systems safety.
Author

**N82-24836*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM - BIOLOGICAL PROBLEMS**
Berrien Moore, III, ed. (New Hampshire Univ.) and R. D. MacElroy, ed. 1982 42 p refs
(NASA-CP-2233; A-8842; NAS 1.55:2233) Avail: NTIS HC A03/MF A01 CSCL 06K

The general processes and controls associated with two distinct experimental paradigms are examined. Specific areas for research related to biotic production (food production) and biotic decomposition (waste management) are explored. The workshop discussions were directed toward Elemental cycles and the biological factors that affect the transformations of nutrients into food, of food material into waste, and of waste into nutrients were discussed. To focus on biological issues, the discussion assumed that (1) food production would be by biological means (thus excluding chemical synthesis), (2) energy would not be a limiting factor, and (3) engineering capacity for composition and leak rate would be adequate.
B.W.

**N82-24837#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**PREDICTING PILOT OPINION RATINGS OF FLYING QUALITIES OF HIGHLY CONTROL AUGMENTED AIRCRAFT**

**USING AN OPTIMAL PILOT MODEL M.S. Thesis**
Randall M. Enright 8 Dec. 1981 172 p refs
(AD-A111136; AFIT/GAE/AA/80D-3) Avail: NTIS HC A08/MF A01 CSCL 05/8

A computer simulation was contructed using optimal control theory to model the human pilot. This optimal pilot model was used to evaluate highly control augmented aircraft and predict the human pilot opinion rating of its flying qualities. Eight aircraft/control system configurations were evaluated twice by the model using two different sets of initial conditions. The performance indices for each of the configurations were plotted and compared to a plot of the human pilot ratings of the same configurations. Variances were noted in the relative positioning of the performance ratings and the relative positioning of the pilot opinion ratings, and the mean difference in ratings between the performance index predictions and the pilot ratings varied with the initial conditions of the model (the initial conditions of the actual flight tests were unknown). The RMS error in the state response to system noise for each configuration was also plotted and compared to the pilot ratings. DOE

**N82-24836#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**DRIVING EXPERIENCE AND TASK DEMANDS IN SIMULATOR AND INSTRUMENTED CAR: A VALIDATION STUDY Progress Report**
G. J. Blaauw 1980 33 p refs
(IZF-1980-9; TDCK-75108; PR-2) Avail: NTIS HC A03/MF A01

The absolute and relative validity of a fixed base vehicle simulator during straight road driving were evaluated in terms of system performance and driver behavior. Inexperienced and experienced drivers performed lateral and longitudinal vehicle control in the simulator and in an instrumented car on the road. Each control was varied with a free and forced accuracy instruction resulting in four levels of task demand. Sequence effects between simulator and instrumented car, and training effects on each system, were studied. Overall results show a good absolute and relative validity for longitudinal vehicle control; lateral vehicle control shows good relative validity. Absolute validity is lacking in lateral control due to a worse perception of lateral translations (absence of kinesthetic feedback). Yaw rotations are perceived in the simulator quite well. The simulator discriminates between inexperienced and experienced drivers better than the instrumented car. Author (ESA)

**N82-25751*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**STS-2 MEDICAL REPORT**
Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. May 1982 31 p refs
(NASA-TM-58245; S-514; NAS 1.15:58245) Avail: NTIS HC A03/MF A01 CSCL 06C

All medially related activities of the Space Transportation System 2 flight are described, ranging from preflight to postflight. Several medical problems occured during the flight. Their was marginal operation on-board potable water system caused by a malfunctioning fuel cell. Work and rest cycles by the crew were altered to maximize the scientific data acquisition. Inadequate time was allocated for food preparation and consumption. There was low water intake by the crew because of the water shortage. R.J.F.

**N82-25752#** Central Research Inst. for Physics, Budapest (Hungary). Central Research Inst. for Physics.
**ELEMENTAL ANALYSIS OF SAMPLES OF BIOLOGICAL ORIGIN RELATIVE TO THEIR PROTEIN CONTENT BY MEANS OF CHARGED PARTICLE BOMBARDMENT**
Z. Szoekefalvi-Nagy, I. Demeter, L. Varga, K. Hollos-Nagy, and L. Keszthelyi Apr. 1981 26 p refs In ENGLISH; HUNGARIAN summary Submitted for publication
(KFKI-1981-26; ISSN-0368-5330; ISBN-963-371-803-1) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The particle excited X-ray emission (PIXE) and the (14)N(d,p)(15)N nuclear reaction was combined for simultaneous elemental composition and nitrogen content determination in biological samples. Using the correlation between nitrogen and protein content the elemental composition is related to the protein content of the sample. The principles and main characteristics of the method are described and illustrative applications are also given. DOE

**N82-25753#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
**THE EFFECTS OF SOME DRUGS ON THE SURVIVAL OF RATS IN VARIOUS STAGES OF HEMORRHAGIC SHOCK**
M. Wijnans and P. vanEck Jun. 1981 30 p refs In DUTCH; ENGLISH summary
(Contract A76/K/095)
(MBL-1981-7; TDCK-75204) Avail: NTIS HC A03/MF A01

Possible treatments of rats in hemorrhagic shock were studied in order to compare simple shock treatments techniques that can be applied by nonmedical personnel. Three procedures were followed in order to obtain three states of shock: (1) bleeding until a certain low blood pressure resulted, producing nearly 100% death of the rats (2) similar bleeding followed by reinfusion of the shed blood after a certain interval, resulting in nearly 100% survival, and (3) a Wiggers type of transfusion resistant shock, causing 80% mortality within 24 hr in spite of the reinfusion of all the shed blood. When the required state of shock was obtained, various treatments were immediately applied. The administration of a saline solution in the stomach following procedure (1) has little or no effect on the survival time, but when injected intraarterially it is very effective. Pharmacological agents (dramine, octapressine, dexamethasone, atropine) have either no effect or make the situation worse. Author (ESA)

**N82-25754#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 16, NO. 2, MARCH - APRIL 1982**
14 May 1982 152 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982
(JPRS-80822) Avail: NTIS HC A08/MF A01

Nutritional and dietic studies in space flight feeding are highlighted. Mineral content in space rations was studied with respect to prevention of ill effects due to hypokinesia. The diets of the crews of the Salyut Space Station were examined for nutritional benefits. Other topics covered include: bacterial activity in weightlessness; the concentration of amino acids in various muscles during prolonged space flight; the adaptivity of man to stressful conditions in the spacecraft cabin; and the functional stability of the cardiovascular and digestive systems during and after long duration space flight.

**N82-25755#** Joint Publications Research Service, Arlington, Va.
**THIRD DECADE OF SPACE BIOLOGY**
O. G. Gazenko and G. P. Parfenov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 1-10 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 4-10

Avail: NTIS HC A08/MF A01

The major results of experiments on microorganisms, plants and animals flown onboard space vehicles during the past two decades were reviewed. To explain the experimental findings, it is hypothesized that living beings develop an indirect adaptation to gravity effects which has a bearing only on the phylogenetic process. T.M.

**N82-25756#** Joint Publications Research Service, Arlington, Va.
**DIET OF CREW IN SALYUT-6 ORBITAL STATION**
V. P. Bychkov, A. S. Ushakov, S. Kalandarov, M. V. Markaryan, Ye. A. Sedova, A. K. Kivuk, and O. S. Khokhlova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 11-15 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 10-13
Avail: NTIS HC A08/MF A01

The nutrition factor in life support systems (LSS) for spacecraft crews consists of the food allowance and equipment to store foods, preparation and intake of food. The main purpose of this factor is to keep a level of vital functions in cosmonauts that would assure the successful implementation of flight programs. The distinctions of outfitting nutrition elements depend on both the duration of space missions and principles of construction of LSS as a whole. The space diets used in flight of five permanent Salyut-6 crews were reviewed. Cosmonauts complained that sterile canned foods became distasteful; due to this, a space diet consisting of 65% freeze-dried foodstuffs was developed and tested. T.M.

**N82-25757#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF 48-DAY FLIGHT ON BLOOD AMINO ACID CONTENT IN THE CREW OF SALYUT-5**

I. G. Popov and A. A. Latskevich *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 16-22 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 14-19

Avail: NTIS HC A08/MF A01

The study of the content of 17 amino acids in plasma of the crewmembers pre- and postflight demonstrated their time-course changes. This concerns mostly cystine and methionine. It is recommended to improve the cystine and methionine content of space diets and to modify technological procedure of food preservation. T.M.

**N82-25758#** Joint Publications Research Service, Arlington, Va.

**STATE OF DIGESTIVE SYSTEM FOLLOWING LONG-TERM SPACE FLIGHTS**

K. V. Smironov, G. D. Syrykh, V. I. Legenkov, L. G. Goland-Ruvinova, I. L. Medkova, and L. I. Voronin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 23-28 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 19-22

Avail: NTIS HC A08/MF A01

In the crewmembers of four Salyut-6 long-term flights, enzyme excretory function of the gastro-intestinal tract was investigated. These studies included: gastric proenzyme, pepsinogen, and pancreatic enzymes, amylase and lipase, in blood and urine, trypsin in blood, intestinal enzymes, invertase and glycyl-L-leucine dipeptidase in feces, and lipids in feces. The results obtained demonstrated a correlation between changes in enzyme excretion and space flight duration and profile. After the 140- and 175-day flight the most marked changes in the digestive organs were seen; they manifested as simultaneous increase in secretory function of the stomach and the pancrease. However, after the 185-day flight, in which advanced countermeasures were used, the above changes were less distinct. Author

**N82-25759#** Joint Publications Research Service, Arlington, Va.

**BIOLOGICAL VALUE AND SHELF LIFE OF CULTURED DAIRY PRODUCTS IN THE DIET OF COSMONAUTS**

I. A. Radayeva, G. A. Rossikhina, V. A. Usacheva, G. S. Poyarkova, and S. P. Shulkina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 29-33 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 23-26

Avail: NTIS HC A08/MF A01

Freeze-dried culture milk products--yoghurt with sugar, yoghurt with fruits and berries, acidophilic paste--were examined in the course of storage. The optimal time of their storage was determined, and high biological value of protein and good viability of lactic acid microflora were demonstrated. These products were recommended to be incorporated into space diets. Author

**N82-25760#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF HYPOKINESIA ON MAN'S NUTRITIONAL STATUS**

V. P. Bychkov, V. N. Gryaznova, S. Kalandarov, A. G. Kasatkina, V. A. Korshunova, M. V. Markaryan, A. K. Sivuk, and O. S. Khokhlova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 34-39 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 26-29

Avail: NTIS HC A08/MF A01

In three series of experiments of 120, 49 and 180 days in duration 36 test subjects were exposed to clinostatic and antiorthostatic hypokinesia. Human requirements for various nutrients were defined under hypokinetic conditions. It was demonstrated that during bed rest exercises together with adequate nutrition and after bed rest certain nutrients can serve as efficient countermeasures against metabolic changes. Author

**N82-25761#** Joint Publications Research Service, Arlington, Va.

**CLINICOPHYSIOLOGICAL CHANGES IN MAN DURING LONG-TERM ANTIORTHOSTATIC HYPOKINESIA**

T. N. Krupina, A. Ya. Tizul, M. P. Kuzmin, and N. I. Tsyganova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 40-45 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 29-34

Avail: NTIS HC A08/MF A01

Using clinical-physiological and biochemical methods, adaptation to prolonged (182 days) head-down tilting (-4.5°) was investigated. It was found that man exposed to hypokinesia for a month or longer, with countermeasures lacking, showed polymorphic clinical-physiological and biochemical disorders accompanied by a decline of his adaptive capabilities. This may aggravate further adapatation and readaptation processes. Author

**N82-25762#** Joint Publications Research Service, Arlington, Va.

**EFFECTS OF 1 ALPHA-HYDROXYCHOLECALCIFEROL AND DIFFERENT AMOUNTS OF PHOSPHORUS IN FOOD ALLOWANCE ON SOME PARAMETERS OF PHOSPHORUS AND CALCIUM METABOLISM IN HYPOKINETIC RATS**

N. V. Blazheyevich, V. B. Spirichev, A. S. Ushakov, M. S. Belakovskiy, A. L. Pozdnyakov, and I. N. Sergeyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 46-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 34-40

Avail: NTIS HC A08/MF A01

The exposure of rats to hypokinesia and a phosphorus-enriched diet (Ca:P = 1:3) was accompanied by hypocalciemia, hyperphosphatemia, calcium losses from bones and formation of calcificates in the kidneys. The decrease of the phosphorus content in the diet (Ca:P = 1:0.5-1:1) prevented these disorders. The administration of 1 OHD3 at a dose of 0.025 micrograms/day arrested hypokinesia-associated hypocalciemia and bone changes. The administration of 1 alpha OHD3 together with a high phosphorus consumption enhanced nephrolithiasis and induced aortal mediacalcinosis in hypokinetic rats. These data indicate that phosphorous consumption should be reduced in order to prevent disorders in phosphorus-calcium metabolism during hypokinesia. They also suggest that administration of 1 alpha OHD3 may be hazardous in the case of excessive phosphorus consumption. Author

**N82-25763#** Joint Publications Research Service, Arlington, Va.

**INFLUENCE OF LEVEL OF MINERALIZATION OF DESALINATED, HIGH QUALITY WATER OF THE HYDROCARBONATE CLASS ON FUNCTIONAL STATE OF MALE WHITE RAT GONADS**

O. I. Balashov, A. B. Sysoyev, and A. V. Rodnikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 55-61 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 40-45

Avail: NTIS HC A08/MF A01

As known, the salt content in the potable water has a gonadotropic effect, the level of which being in agreement with the traditional norm. However, within the normal limits one can distinguish better or worse functional manifestations. It is shown that statistical treatment of the data, using the Student t-test, is of low efficiency because it neglects the ratio between groups. Of greater efficiency is the statistical treatment based on the domineering order. Proceeding from the theoretical speculations and experimental results, potable water with the mineral content of 250 mg/lambda should be regarded as optimal. Author

**N82-25764#** Joint Publications Research Service, Arlington, Va.

**SOME PHYSIOLOGICAL AND BIOCHEMICAL FEATURES OF CELLS OF CARROT GALL DEVELOPED IN WEIGHTLESSNESS**

M. G. Tairbekov, L. A. Voronkov, and N. A. Guzhova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 62-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 45-48

Avail: NTIS HC A08/MF A01

The results of experiments with the carrot tissues infected with Agrobacterium tumefaciens flown onboard the biosatellite Cosmos-1129 are presented. Postflight, the respiratory activity of tumor cells was determined and K(+) and Na(+) permeability of cell membranes was measured. The resulting data give evidence that in weightlessness the development of the carrot gall tumor is accompanied by changes in the above physiological and biochemical parameters. The changes are, however, within the physiological limits, leading to no pathologies of the whole cell. T.M.

**N82-25765#** Joint Publications Research Service, Arlington, Va.

### FUNCTIONAL STATE OF RAT GASTROINTESTINAL TRACT ORGANS FOLLOWING FLIGHT IN COSMOS-1129 BIOSATELLITE

K. V. Smironov, L. G. Goland-Ruvinova, N. P. Goncharova, O. V. Zhiznevskaya, I. L. Medkova, N. M. Nikolayeva, R. A. Pechenkina, and A. N. Petrusenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 62-73 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 68-73

Avail: NTIS HC A08/MF A01

The enzyme-excretory and motor functions of the gastrointestinal tract of rats flown for 18.5 days onboard the biosatellite Cosmos-1129 were studied. Immediately postflight, the pepsin synthesis decreased and the dipeptide parietal hydrolysis increased. At R+6, the activity of the enzymes responsible for the cavitary and parietal hydrolysis of lipids significantly grew and that of the enzymes involved in protein hydrolysis fell. At R+30, the carbohydrate hydrolysis was inhibited and the activity of lipolytic enzymes enhanced markedly. The amplitude and rhythm of stomach biopotentials were disbalanced. The so-called immobilization stress of intact rats brought about activation of lipase, monoglyceridyl lipase, monoglyceridyl lipase, dipeptidase and inhibition of amylase and invertase. The immobilization exposure of flight rats caused inhibition of the membrane hydrolysis of proteins and carbohydrates and lack of the pancreatic reaction. Author

**N82-25766#** Joint Publications Research Service, Arlington, Va.

### AMINO ACIDS OF FEMORAL QUADRICEPS OF RATS FOLLOWING FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

T. F. Vlasova, Ye. B. Miroshnikova, V. V. Polyakov, and T. P. Murugova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 74-78 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 53-56

Avail: NTIS HC A08/MF A01

The amino acid composition of the muscle of rats flown onboard the biosatellite and exposed to the ground-based synchronous control experiment was studied. The weightless rats showed changes in the amino acid concentration in the quadriceps muscle. The centrifuged flight and synchronous rats displayed an accumulation of free amino acids in the above muscle. T.M.

**N82-25767#** Joint Publications Research Service, Arlington, Va.

### PLASMA AND TISSUE LIPIDS OF RATS FOLLOWING FLIGHT ABOARD COSMOS-936 BIOSATELLITE

J. Ahlers, R. A. Tigranyan, and M. Praslicka *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 79-82 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 56-58

Avail: NTIS HC A08/MF A01

The content of triglycerides, total phospholipids and nonesterified fatty acids was measured in plasma and tissues of rats flown for 18.5 days on Cosmos-936 in the weightless and centrifuged state. The weightlessness exposure increased lipid fractions in plasma and tissues, and artificial gravity produced a beneficial effect. Author

**N82-25768#** Joint Publications Research Service, Arlington, Va.

### PLASMA AND TISSUE LIPIDS OF RATS FOLLOWING FLIGHT ABOARD THE COSMOS-1129 BIOSATELLITE

J. Ahlers, R. A. Tigranyan, T. Djatelinka, B. Schmeida, M. Toropila, and M. Praslicka *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 83-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 58-61

Avail: NTIS HC A08/MF A01

Concentrations of triglycerides, total cholesterol, lipid phosphorus and nonesterified fatty acids were measured in blood plasma, liver, thymus, bone marrow and adipose tissues of rats flown for 18.5 days onboard the biosatellite Cosmos-1129. This exposure was accompanied by increases in lipomobilization, content of total cholesterol and lipid phosphorus in plasma, and triglycerides in the thymus and bone marrow. The postflight exposure to repeated stresses demonstrated changes in the lipid content in all animal groups, especially in flight rats. Author

**N82-25769#** Joint Publications Research Service, Arlington, Va.

### MINERAL PHASE AND PROTEIN MATRIX OF RAT OSSEOUS TISSUE FOLLOWING FLIGHT ABOARD THE COSMOS-1129 BIOSATELLITE

A. A. Prokhonchukov, K. S. Kosystnichenko, R. A. Tigranyan, and N. A. Komisarova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 87-92 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 61-64

Avail: NTIS HC A08/MF A01

The major parameters of the mineral component and protein matrix of bones were investigated in 30 rats flown onboard Cosmos-1129. Postflight, the content of calcium decreased by 7.8%, that of phosphorus diminished by 11.8%, the Ca/P ratio increased by 5.9%, the content of collagen diminished by 14.7% and that of non-collagenous proteins by 45.7% and the content of sialic and hexuronic acids increased by 36.2% and 14.6%, respectively, as compared to the vivarium control. The role of EDTA- and HCl-protein extracts, soluble and poorly soluble calcium fractions, protein-Ca-phosphate complex, sialic and hexuronic acids n the mechanism of calcium binding by the bone organic matrix are discussed. Author

**N82-25770#** Joint Publications Research Service, Arlington, Va.

### NEUROPHYSIOLOGICAL CHARACTERISTICS OF SENSORIMOTOR CORTEX OF RATS SUBMITTED TO EARLY MOTOR DEPRIVATION AND CONDITIONING

I. A. Shimko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 93-101 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 64-70

Avail: NTIS HC A08/MF A01

Young rats, beginning with the age of 1 month, were kept in small size cages for 3 months, i.e., were exposed to 3-month motor deprivation. This exposure caused a modulating effect of a diminished activity of neuronal populations in the sensorimotor cortex which manifested as a prolongation of the latent periods of primary responses and recovery cycles of excitation of the neuronal populations generating the responses. The differences in the opposite changes in the sensorimotor cortex of the young animals that developed following prolonged deprivation and training of similar duration were seen in the parameters of excitation recovery cycles rather than in the latent periods. Both early motor deprivation and training did not influence the heterochronic development, emergence and subsequent attainment of the maximum amplitude of components of the testing primary response in the process of a gradual increase of the stimulus-to-stimulus interval. Author

**N82-25773#** Joint Publications Research Service, Arlington, Va.

### MAN'S ADAPTIVE REACTIONS TO ACOUSTIC PARAMETERS OF ISOLATED HABITATS

G. A. Manovtsev, V. A. Korsakov, G. I. Odinokov, and V. A. Stepanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 113-120 refs Transl. into ENGLISH from Kosm. Biol. Viakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 76-81

Avail: NTIS HC A08/MF A01

Noise plays an important part in the set of factors that characterize man's distinctive living conditions in pressurized chambers. The study of acceptability of noise levels, subjective evaluation of the acoustic environment by the test subjects, and examination of their cardiovascular function demonstrated the development of adaptive reactions to the noise effects which were accompanied by a certain tension in the cardiovascular system. Author

**N82-25774#** Joint Publications Research Service, Arlington, Va.
**AGE-RELATED DISTINCTIONS OF ECHOCARDIOGRAPHIC PARAMETERS OF HEALTHY MAN**
A. M. Babin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 121-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 82-84

Avail: NTIS HC A08/MF A01
Certain parameters of intracardiac hemodynamics and myocardial contractility of healthy men were examined by echocardiography. Age-related variations of these parameters were seen in representatives of different age groups. It is emphasized that echocardiography may find a wider application in space medicine. Author

**N82-25775#** Joint Publications Research Service, Arlington, Va.
**ROLE OF POLARIZATION AND RESONANCE IN ASSESSING THE BIOLOGICAL EFFECTS OF ELECTROMAGNETIC RADIATION**
A. A. Galkin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 125-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 84-87

Avail: NTIS HC A08/MF A01
The dosimetric concept of measurements of electromagnetic radiations (EMR) during irradiation of biological objects can be realized by methods of mathematical modeling of EMR interactions with biological objects, which can be represented as an image of the human body as a uniform ellipsoid of revolution. The efficient surface of EMR absorption for the models shows a marked resonance dependence on the radiation frequency. The ratio of the largest to the smallest axes of the ellipsoid of revolution can be used as resonance criterion. Besides, radiation polarization needs to be taken into consideration. The frequency dependence of the efficient absorption surface for three major types of radiation polarization is discussed. An applicability of the calculation method to the evaluation of the EMR absorbed dose rate is demonstrated. Author

**N82-25776#** Joint Publications Research Service, Arlington, Va.
**SYMPATHOADRENAL SYSTEM OF COSMONAUTS FOLLOWING 7-DAY FLIGHTS**
N. A. Davydova and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 131-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 88-91
Avail: NTIS HC A08/MF A01
The sympathoadrenal system (SAS) is an important element of neurohumoral regulation, and for this reason it is particularly important to study the activity of its hormonal and mediatory elements, which is an indicator of stress reactions, during space flights when the human body is exposed to extreme factors, and the success of the flight depends largely on man's capacity to adjust to these conditions. A number of researchers examined SAS activity in cosmonauts following flights of various duration (1-4); however, the results do not reflect adequately the changes occurring in the SAS due to the fact that only some aspects of catecholamine (CA) metabolism were studied. Out objective here was to determine whether a stress reaction could occur following 7-day space flights by using the complete spectrum of parameters characterizing SAS activity. Author

**N82-25777#** Joint Publications Research Service, Arlington, Va.
**VENOUS PRESSURE AS AN INDICATOR OF CIRCULATING BLOOD VOLUME**
A. S. Nekhayev, V. A. Degtyarev, and V. S. Bednenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1982 p 137-140 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 91-92

Avail: NTIS HC A08/MF A01
The reduction in circulating blood volume (CBV) due to fluid loss in weightlessness can be viewed as one of the defense mechanisms that prevents development of hypertension and hypervolemia in the intrathoracic and cranial parts of the circulatory system. However, upon returning to Earth's gravity, this change in CBV could be the cause of decline in orthostatic stability of cosmonauts. For this reason, it is necessary to monitor CBV dynamics in the postflight period, particularly with correction of fluid-electrolyte balance. The possibility of indirect evaluation of CBV, in particular, by means of the indicator of venous pressure in the system of jugular veins measured indirectly is explored. Author

**N82-25778#** Joint Publications Research Service, Arlington, Va.
**ELECTROMETRIC CHARACTERISTICS OF MAN'S GASTROLINGUAL REFLEX**
I. Ya. Yakovleva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 2, Mar.-Apr. 1
into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 16, no. 2, Mar.-Apr. 1982 p 92-93

Avail: NTIS HC A08/MF A01
Results revealed that exposure of healthy men to conditions simulating the period of acute adaptation to weightlessness is associated with impaired function of the taste organ and is characterized by a change in the gastrolingual reflex electrometry of the taste analyzer was used to characterize man's gastrolingual reflex in the presence of usual gravity and with alteration of Earth's gravity. L.F.M.

**N82-25779*#** SRI International Corp., Menlo Park, Calif.
**PURKINJE IMAGE EYETRACKING: A MARKET SURVEY Final Contractor Report**
Lo. F. Christy Mar. 1979 144 p refs
(Contract NAS2-9846)
(NASA-CR-166338; NAS 1.26:166338) Avail: NTIS HC A07/MF A01 CSCL 20F
The Purkinje image eyetracking system was analyzed to determine the marketability of the system. The eyetracking system is a synthesis of two separate instruments, the optometer that measures the refractive power of the eye and the dual Purkinje image eyetracker that measures the direction of the visual axis. E.A.K.

**N82-25780#** California Univ., Irvine, Dayton, Ohio.
**TOXIC HAZARDS RESEARCH UNIT Annual Technical Report, Jun. 1980 - May 1981**
J. D. MacEwen and E. H. Vernot Wright-Patterson AFB, Ohio AMRL Dec. 1981 139 p refs
(Contract F33615-80-C-0512; AF Proj. 6302; MF58524025)
(AD-A110587; AFAMRL-TR-81-126) Avail: NTIS HC A07/MF A01 CSCL 06/20
Chronic toxicity or oncogenic studies were carried out with methylcyclohexane, purified 1,1-dimethylhydrazine, Otto Fuel II, JP-10, RJ-5, and JP-4. A subchronic inhalation study was conducted with shale derived JP-5 and Decalin fuels. Acute toxicity studies were conducted on a variety of chemical agents used by the Air Force and Navy. GRA

**N82-25781#** Lund Univ. (Sweden). Radiofysika Inst.
**IN VIVO X-RAY FLUORESCENCE ANALYSIS FOR MEDICAL DIAGNOSIS. A NON-INVASINE METHOD FOR QUANTITATIVE DETERMINATION OF KIDNEY FUNCTION AFTER RADIOGRAPHIC EXAMINATIONS WITH IODINATED CONTRAST MEDIA Ph.D. Thesis**
Thomas Groenberg May 1981 128 p refs
(LUNFD6/NFRA-1013/1-21/(1981);
LUMEDW/MERI-1013/1-21/(1981)) Avail: NTIS (US Sales Only) HC A07/MF A01; DOE Depository Libraries
A Monte Carlo code was constructed and used to simulate the energy distribution of scattered photons obtained in various in vivo X-ray fluorescence measurements. The structure of this distribution was investigated and discussed. Studies of the response function of the Ge-detector used made it possible to

convert the calculated scatter spectra to pulse height distributions. These studies are valuable tools in designing in vivo X-ray fluorescence measurements. In vivo X-ray fluorescence measurements were used for quantitative non invasive measurements of the concentration of iodine containing contrast media in rabbits without the use of blood or urine sampling. The biological half life of the contrast medium in the soft tissue part of the nose (measured in vivo) was similar to that in serum (measured in vitro) when determined in the period 2 to 4 hours after injection. The method can be used for clinical evaluation of kidney function. DOE

**N82-25782#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands)
**SURVEY OF THE EXPERIMENTAL SHOCK RESEARCH PERFORMED AT THE MEDICAL BIOLOGICAL LABORATORY TNO AND AT THE PHARMACOLOGICAL LABORATORY, UNIVERSITY OF AMSTERDAM**
C. vanderMeer Aug. 1981 19 p refs In DUTCH; ENGLISH summary Sponsored in cooperation with Amsterdam Univ.
(Contract A76/K/095)
(MBL-1981-9; TDCK-75515) Avail: NTIS HC A02/MF A01

Experimental research on shock is surveyed. This research is urgently needed since the optimal treatment of shock patients is still a matter of discussion, while the occurrence of irreversible shock is still a serious problem. The research is partly aimed at a study of shock models, concerning different aspects of irreversible shock, i.e., tourniquet shock, hemorrhagic shock, endotoxin shock and intestinal ischemia shock. A model of shock kidney is studied as well as possibilities of emergency treatment to prevent the occurrence of shock and some aspects of diver's disease. The evaluation of certain forms of shock treatment is being initiated. Author (ESA)

**N82-25783#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.
**THE EFFECT OF NOISE-INDUCED HEARING LOSS ON THE ABILITY TO UNDERSTAND SPEECH**
J. A. P. M. deLaat and G. F. Smoorenburg Jul. 1981 17 p refs In DUTCH; ENGLISH summary
(Contract A76/K/105)
(IZF-1981-11; TDCK-75525) Avail: NTIS HC A02/MF A01

Speech reception thresholds (50% sentence intelligibility) were measured for 22 persons (44 ears) with noise induced hearing loss (NIHL) and for 7 persons with normal hearing. The speech reception thresholds were measured in quiet and also in ambient noise at levels of 25, 40, 55, and 70 dbA. In ambient noise, an average speech reception threshold for the NIHL group was about 4 db higher then the average threshold for normals. The 4 db increase of signal to noise ratio required to keep the sentence score at 50% for the NIHL group can also be expressed in a loss of sentence score when the sentences are presented at the same signal to noise ratio to normals and NIHL group. For a signal to noise ratio at which normals just score 100%, the score for the NIHL group is only 33%. The hearing loss criterion of 25 db averaged across the losses at 500, 1000 and 2000 Hz implies a severe handicap to understand speech, in particular in noisy environments. In view of this handicap, hearing loss in excess of 15 db averaged across 1000, 2000 and 3000 Hz can not be tolerated. Author (ESA)

**N82-25784#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.
**RECOMMENDATIONS TO AVOID HEARING DAMAGE DURING FIRING OF THE M198, FH70, M71 AND FH77 TOWED HORWITZERS**
A. M. Mimpen and G. F. Smoorenburg Jul. 1981 22 p In DUTCH; ENGLISH summary
(Contract A79/KL/086)
(IZF-1981-13; TDCK-75526) Avail: NTIS HC A02/MF A01

Peak sound pressure levels were measured at several distances around the muzzles of four types of towed howitzers fired with different charges. For small charges, peak levels were determined also at the ear of the gunner and the other crew positions. The effective duration of each sound impulse was determined. On the basis of peak level and duration, the preferred number and the maximum number of firings not to be exceeded were calculated for three kinds of hearing protection in order to limit the risk of a hearing loss of 15 db or more averaged across 1.2 and 3 kHz to 5% (preferred value) or 10% (maximum). For some howitzers the A-weighted impulse level was measured and can be used to estimate annoyance from firing noise. Author (ESA)

**N82-25785#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.
**STATISTICAL EXAMINATION OF HEARING LOSS DUE TO GUNFIRE NOISE AND INDUSTRIAL NOISE: CONSEQUENCES FOR SCREENING AUDIOMETRY WITH FIXED FREQUENCIES**
J. A. P. M. deLaat and G. F. Smoorenburg Sep. 1981 22 p refs In DUTCH; ENGLISH summary
(Contract A78/K/095)
(IZF-1981-20; TDCK-75531) Avail: NTIS HC A02/MF A01

The reliability of screening audiometry with fixed frequencies as compared to screening audiometry with a continuously sweeping frequency was investigated. The investigation was based on two data sets: 528 audiograms of 278 persons exposed to gunfire noise and 1306 audiograms of 679 persons exposed to industrial noise. Looking for gunfire noise dips of 30 db or greater at any frequency, the highest score is obtained with a screening frequency of 6300 Hz and a screening level of 25 db. The best choice for gunfire noise dips is 5000 Hz and 6300 Hz. For dips due to industrial noise, the best single screening frequency is 4000 Hz. For two screening frequencies the best choice is 4000 and 8000 Hz. The data sets show that two to four screening frequencies are sufficient and that screening levels should be chosen 5 to 10 db below the target level. Author (ESA)

**N82-25786#** Naval Training Equipment Center, Orlando, Fla.
**PERFORMANCE MEASUREMENT AND NAVY'S TACTICAL AIRCREW TRAINING SYSTEM Final Technical Report, Mar. - Apr. 1981**
Gerald R. Stoffer Sep. 1981 39 p refs
(AD-A110669; NAVTRAEQUIPC-IH-333) Avail: NTIS HC A03/MF A01 CSCL 05/9

The development and use of the Tactical Aircrew Training System (TACTS) as a means for training advanced air combat skills are described. Pilot performance measurement capabilities of the TACTS are reviewed in terms of their value for pilot selection, aircrew training, assessment, and simulator design. Several approaches and methods used to conceptualize and measure air combat maneuvering (ACM) performance are presented. Limitations in existing TACTS performance measurement capabilities are illustrated in terms of several psychometric, training, and TACTS operational user feasibility requirements for a system of performance measurement. It is concluded that while the existing TACTS represents a highly advanced aviation engineering technology that can provide extremely valuable training, that same technology has largely ignored the functional requirements for a system of human performance measurement. Improvements in the TACTS performance measurement capabilities will improve its training value even further. Author (GRA)

**N82-25787#** Duke Univ., Durham, N. C. School of Business Administration.
**CONTINGENT DECISION BEHAVIOR: A REVIEW AND DISCUSSION OF ISSUES**
John W. Payne Feb. 1982 61 p refs
(Contract N00014-80-C-0114; NR Proj. 197-063)
(AD-A111655; ONR-82-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

A question of great concern in decision research is the extent to which the strategies used by an individual in making a judgment or choice are invariant across task environments. This paper reviews research showing that information processing in decision making, as in other areas of cognition, is highly contingent upon the demands of the task. Theoretical frameworks for handling task and context effect are explored: (1) Cost/benefit principles; (2) Perceptual processes; and (3) Adaptive production systems. Both the cost/benefit and perceptual frameworks are shown to have strong empirical support. Both frameworks, however, also have unresolved conceptual problems that are discussed. The adaptive production system framework has less direct support, but has the desirable property that it contains elements of both of the other frameworks. The question of how the different theoretical frameworks might be integrated is explored. Author (GRA)

**N82-25788#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).
**RECOGNITION EXPERIMENTS WITH THERMAL IMAGES**

**PART 2: EFFECT OF RASTER FREQUENCY** In DUTCH; ENGLISH summary
A. vanMeeteren and J. M. Schipper 1980 21 p refs
(Contract A76/KL/060)
(IZF-1980-14; TDCK-75109) Avail: NTIS HC A02/MF A01

The effect of raster frequency in recognition experiments with thermal images was investigated. Experiments, determining the recognition chance as a function of scan line density, are described. For raster scanned images, the raster frequency is the dominant image quality factor. The modulation transfer functions of sampling aperture and display spot are of minor significance with regard to recognition of relevant objects in practical situations. The probability of recognition of a set of thermal pictures was measured psychophysically as a function of the raster frequency. When averaged over 6 objects in different orientations and with different degrees of warming up, the critical raster frequency required for 70% correct identification turned out to be 1.7 lines per meter on the target. However, this critical raster frequency differs considerably for different objects as well as for different appearances of the same object. It makes no sense to normalize the critical raster frequency relative to object dimensions. The prediction of the useful range of actual thermal imaging devices is outlined, starting from experimental data. Author (ESA)

**N82-25788#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
**RECOGNITION EXPERIMENTS WITH THERMAL IMAGES. PART 3: EFFECT OF CONTRAST RENDITION**
W. J. H. Meijer and A. vanMeeteren Apr. 1981 24 p refs
In DUTCH; ENGLISH summary
(Contract A76/KL/060)
(IZF-1981-5; TDCK-75519) Avail: NTIS HC A02/MF A01

The adjustment of contrast and luminance of displays for thermal imaging devices is discussed, with reference to adapting the dynamic range of the display to the dynamic range of the signals. Two questions are discussed with regard to this adaptation: the recognizability of thermal images affected if the dynamic range of the display is not fully utilized and advantages in displaying part of the signal range, e.g., colder regions or warmer regions, with enhanced contrast. Experiments demonstrate the best strategy utilizes both the signal and the display dynamics as completely as possible. Author (ESA)

**N82-25790#** Admiralty Marine Technology Establishment, Teddington (England).
**APU MAN-COMPUTER STUDIES GROUP SEMINAR PROCEEDINGS 1**
R. Gregory HMSO Jun. 1980 50 p refs Proceedings held at Teddington, England, Feb. - Apr. 1980
(AMTE(E)-TM-80109; BR76709) Avail: NTIS HC A03/MF A01

Seminars held to explore the potential of computers as intelligent assisting devices in training and operational contexts are summarized. A cybernetic framework is proposed for understanding computer assisted instruction. Subject matter representation and knowledge representation schemes are presented.

**N82-25791#** Admiralty Marine Technology Establishment, Teddington (England).
**THREE COMPUTER ROLES IN A CYBERNETIC LEARNING SYSTEM**
*In its* APU Man-Computer Studies Group Seminar Proc. 1 Jun. 1980 p 7-17 refs

Avail: NTIS HC A03/MF A01

The importance of subject matter or knowledge representation in computer assisted instruction CAI is discussed. The components of such a learning system are identified as the learner, subject matter representation, subject matter expert, and the tutor. Within this framework, three roles that a computer can play in a learning system are discussed. The location of the system tutor, the component which mediates the learning process, is shown to be directly related to the sensitivity of the computer to the learner. A pre-CAI system where the computer is used as a simulator, a conventional CAI system, and an intelligent CAI system where the computer contains the tutor are outlined. Author (ESA)

**N82-25792#** Admiralty Marine Technology Establishment, Teddington (England).
**THE REPRESENTATION OF KNOWLEDGE: GOLDSTEIN'S GENETIC GRAPH**
*In its* APU Man-Computer Studies Group Seminar Proc. 1 Jun. 1980 p 19-31 refs

Avail: NTIS HC A03/MF A01

The genetic graph is a computer based data structure that holds a knowledge representation, i.e., part of a program combining the technology of artificial intelligence with computer aided instruction (CAI). The structure emphasizes the representation of the evolution of expertise from the perspective of the learner with respect to intelligent CAI. An epistemology is established as the connective structure of the graph. The links between nodes themselves represent learning processes, such as generalization, analogy and refinement. As a result, the genetic graph allows a powerful modelling facility, i.e., the coaching system is more sensitized to development of the learner's expertise, this being achieved by the graph's capacity to yield information about the learner's knowledge state, his learning style and his route through the syllabus. Author (ESA)

**N82-25793#** Admiralty Marine Technology Establishment, Teddington (England).
**THE REPRESENTATION OF KNOWLEDGE: PASK'S L SUB P**
*In its* APU Man-Computer Studies Group Seminar Proc. 1 Jun. 1980 p 33-46 refs

Avail: NTIS HC A03/MF A01

A general introduction to the proto language L sub p for the representation of conversations between intelligent entities is given. The main concepts and operations that constitute L sub p are explained including derivation, coherency and organizational closure, rule of Genoa and analogy, pruning, saturation, condensation, and analogy and isomorphic inference. The computer implementation of L sub p THOUGHTSTICKER is treated. It is used to represent the knowledge held by one or more persons concerning any conversational domain. Knowledge is represented as topics at nodes of a mesh which may be linked by derivational, analogical, or both types of connectivity. Author (ESA)

**N82-25794#** Naval Submarine Medical Research Lab., Groton, Conn.
**COLD WEATHER GOGGLES. 1: OPTICAL EVALUATION Interim Report**
S. M. Luria, David F. Neri, Jo Ann S. Kinney, and Helen M. Paulson 19 Jan. 1982 34 p refs
(M0095PN001)
(AD-A111333; NSMRL-970) Avail: NTIS HC A03/MF A01 CSCL 06/17

To compare the utility of a dozen protective goggles for the cold, their transmittance of harmful radiation, optical quality, resistance to fogging, and comfort were measured. The transmittances were discussed in terms of thresholds for damage to the eye from various bands of light radiation. The optical characteristics were evaluated against military specifications for aviators' visors. All the goggles except one screened out enough UV at sea level, and all but two screened out enough of the visible and infrared radiation. There were wide variations in optical quality, resistance to fogging, and comfort. A set of specifications was drawn up to meet the various requirements, but it was concluded that one set of goggles was unlikely to be satisfactory for the wide range of conditions which would be encountered. Author (GRA)

**N82-25795#** Navy Personnel Research and Development Center, San Diego, Calif.
**OPERATOR PERFORMANCE ON TWO OFFICE DATA ENTRY SYSTEM TESTBEDS: PRELIMINARY ANALYSES Special Report, 1978 - 1979**
Eleanor R. N. Robinson, John S. Malone, and Richard W. Obermayer Feb. 1982 28 p refs
(AD-A111535; NPRDC-SR-82-16) Avail: NTIS HC A03/MF A01 CSCL 05/8

This effort tested the effectiveness of two computerized data entry systems designed to improve operator efficiency and reduce the number of errors in Navy personnel records. Data were collected on operator performance times and the quantities of errors made using (1) a stand-alone system; and (2) a distributed data entry system that used an off-site computer in tandem with an on-site microprocessor. Preliminary analyses of data obtained were conducted to assess user acceptance so that modifications, if needed, could be implemented before the system was installed. Results showed that the distributed office data entry system provided a distinct advantage over the self-contained system in reducing errors in the information system without adding to the office workload. Also, using this distributed system to make changes resulted in a 75 percent time savings over the manual method. The time saved in making changes would be, by itself, a significant factor in evaluating the cost effectiveness of systems employing computer data bases. Author (GRA)

**N82-25796#** Clarkson Coll. of Technology, Potsdam, N.Y.
**ANALYSIS OF THE POLARIZATION DEPENDENCE OF THE INTERACTION BETWEEN HUMAN FRAME TARGETS AND RADIO FREQUENCY SENSOR FIELDS Final Report, 8 May 1979 - 16 Apr. 1981**
Harold R. Raemer Griffiss AFB, N.Y. RADC Nov. 1981 293 p refs
(Contract F30602-78-C-0102; AF Proj. DNAR)
(AD-A111590; RADC-TR-81-244) Avail: NTIS HC A13/MF A01 CSCL 17/9

An analytical model of a class of RF intrusion sensor systems was constructed. The constituents of the model are: a slotted coaxial cable laid circularly on the ground, an electromagnetic scatterer intended to simulate a human frame target in the vicinity of the cable and an antenna near the center of the circular configuration. Using the concept of a general electromagnetic field as a superposition of plane-wave fields ('plane-wave spectral representation of fields'), calculations were made of: (a) the fields from the cable slots as if the cable were in free space; (b) the effect of ground reflections on the fields were from the slots; (c) the fields of the waves scattered from the human frame target directly toward the antenna in response to the incident wave fields (a) plus (b); and (d) the effect of ground reflections on the scattered wave fields. These calculations were programmed for the VAX computer and some numerical results are presented for various orientations and positions of the human frame target. Author (GRA)

**N82-25797#** Army Research Inst. of Environmental Medicine, Natick, Mass.
**AUXILIARY COOLING: COMPARISON OF AIR-COOLED VERSUS WATER COOLED VESTS IN HOT-DRY AND HOT-WET ENVIRONMENTS**
Yair Shapiro, Kent B. Pandolf, Michael N. Sawka, Michael M. Toner, Fred R. Winsmann, and Ralph F. Goldman 27 Oct. 1981 21 p refs
(DA Proj. 3E1-62777-A-878)
(AD-A110554; USARIEM-M-4/82) Avail: NTIS HC A02/MF A01 CSCL 06/17

Water-cooled, air-cooled and ambient air ventilated auxiliary cooling vests were evaluated in a hot-wet climate (HW) (35 C, 75% rh) and a hot-dry environment (HD) with additional infrared radiation (T sub a = 49 C, 20% rh, 68 C black globe temperature). Twelve subjects dressed in full chemical warfare combat uniforms underwent 120 min of heat exposure in each combination of climate and cooling vest except for the hot-dry environment and ambient-air vest. During each exposure, total exercise time was 20 min and rest time 100 min. This resulted in a mean time weighted metabolic rate of 180 W. No significant differences were found between the air or the water-cooled vests in either the HD or HW climates. It was concluded that an air-cooled vest can be used with the same efficiency as a water-cooled vest. In contrast, the ambient-air vest was shown to have a low effectiveness in HW and to be dangerous in a HD climate. GRA

**N82-25798#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde.
**VISUAL ERGONOMICS IN CARTOGRAPHIC AND LITHOGRAPHIC WORK AT THE TOPOGRAPHIC SERVICE. PART 2: REQUIREMENTS AND RECOMMENDATION FOR WORK STATIONS**
E. Ellens and H. J. Leebeek Jul. 1981 28 p In DUTCH; ENGLISH summary
(Contract A76/KL/001)
(IZF-1981-14-Pt-2; TDCK-75527-Pt-2) Avail: NTIS HC A03/MF A01

Advice about the ergonomics of map engravers work is given. As the different aspects of the advice are very much interwoven, a complete review concerning all the different ergonomic issues is given. The most important aspects are the worktable, sitting, the engraving task itself, working attitudes and general and local lighting. The requirements of each of these points are quite exacting because of the high performance demands of the task. Much attention was paid to the development of a new worktable, specially designed for this type of work. Author (ESA)

**N82-25799#** Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
**INQUIRY OF FIELD EXPERIENCE WITH CAPS FOR THE ROYAL DUTCH ARMY**
W. A. Lotens Oct. 1981 12 p ref In DUTCH; ENGLISH summary
(Contract A79/KL/111)
(IZF-1981-21; TDCK-75532) Avail: NTIS HC 02/MF A01

During a field trial, an emergency gas mask was worn by military personnel of eight different armed units and services, developed for the Royal Dutch Army. The average total wearing time was 19.3 hr and the average longest uninterrupted period was 2.4 hr. complaints, due to breathing impairment and design of the cap were reported. In comparison with the gas mask, however, the cap causes considerably less strain. The cap can be usable in its present shape, however improvements are recommended for breathing impairment compatibility with eyeglasses and optical instruments, leakage at the skin, and the stain of charcoal dust. Author (ESA)

[illegible]

As the different aspects of the advice are very much interwoven, a complete review [illegible] is given. The most important aspects [illegible] [illegible] Author (ESA)

[illegible]

as completely as possible. Author (ESA)

N82-25790# Admiralty Marine Technology Establishment, Teddington (England).

APU MAN-COMPUTER STUDIES GROUP SEMINAR PROCEEDINGS 1

R. Gregory HMSO Jun. 1980 90 p refs Proceedings held at Teddington, England, Feb. - Apr. 1980

(AMTE(T)-TM-80103; BR75709) Avail: NTIS HC A05/MF A01

Seminars held to explore the potential of computers as intelligent assisting devices in training and operational contexts are summarized. A systematic framework is proposed for understanding computer assisted instruction. Subject matter representation and knowledge representation schemes are presented.

N82-25791# Admiralty Marine Technology Establishment, Teddington (England).

THREE COMPUTER ROLES IN A CYBERNETIC LEARNING SYSTEM

In its APU Man-Computer Studies Group Seminar Proc. 1 Jun. 1980 p 7-17 refs

Avail: NTIS HC A05/MF A01

The importance of subject matter or knowledge representation in [illegible] instruction CAI is discussed. The components of such a learning system are identified as the learner, subject matter representation, [illegible], and the tutor. Within this framework, three roles that a computer can play in a learning system are discussed. The function of the system tutor, the component which mediates the learning process, is shown to be directly related to the sensitivity of the computer to the learner. A pre-CAI system where the computer is used as a simulator, a conventional CAI system, and an intelligent CAI system where the computer [illegible] the tutor are outlined. Author (ESA)

[illegible] with an on-line microprocessor [illegible] that modifications, if needed, could be [illegible] data entry system provided a distinct advantage over the self-contained system in reducing errors in the information system without adding to the office workload. [illegible]

[illegible]

ANALYSIS OF THE POLARIZATION DEPENDENCE OF THE INTERACTION BETWEEN HUMAN SIZED TARGETS AND RADIO FREQUENCY [illegible]

(Contract F30602-78-C-0102; AF Proj. 2305)

(AD-A111690; RADC-TR-81-144) Avail: NTIS HC A15/MF A01

An analytical model of a class of [illegible] was constructed. [illegible] of the cable end of antenna [illegible] configuration. Using the concept of a general electromagnetic field as a superposition of plane-wave fields [illegible]

N82-25797# Army Research Inst. of Environmental Medicine, Natick, Mass.

AUXILIARY COOLING: COMPARISON OF AIR-COOLED VERSUS WATER-COOLED VESTS IN HOT-DRY AND HOT-WET ENVIRONMENTS

[illegible] Toner, Fred R. Winsmann and Ralph F. Goldman 23 Oct. 1981 21 p refs

(DA Proj. 3E1-62777-A-879)

(AD-A110584; USARIEM-M-4/82) Avail: NTIS HC A02/MF A01 CSCL 06/17

Water-cooled, air-cooled and ambient air ventilated auxiliary cooling vests were evaluated in a hot-wet climate [illegible] and a hot-dry environment [illegible] Twelve subjects [illegible] 120 min of heat exposure in each combination of climate and cooling vest except for the hot-dry environment and ambient air vest. [illegible] 20 min and [illegible] 100 min. [illegible] a mean total weighted metabolic rate of 180 W. No significant differences were found between the use of the water-cooled vests in either the HD or HW climates. It was concluded that an air-cooled vest can be used with the same efficiency as a water-cooled vest. In contrast, the ambient-air vest was shown to have a low effectiveness in [illegible]

N82-25798# [illegible]

VISUAL ERGONOMICS IN CARTOGRAPHIC AND LITHOGRAPHIC WORK AT THE TOPOGRAPHIC SERVICE. PART 2: REQUIREMENTS AND RECOMMENDATIONS FOR WORK STATIONS

[illegible] Jan. 1981 [illegible] p In DUTCH; ENGLISH summary

(Contract A78/KLu/[illegible])

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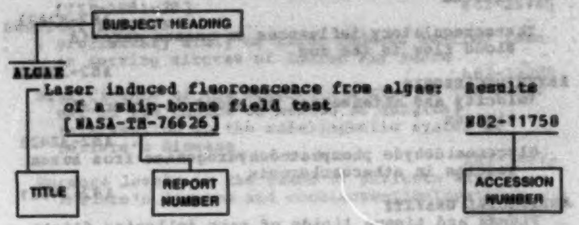

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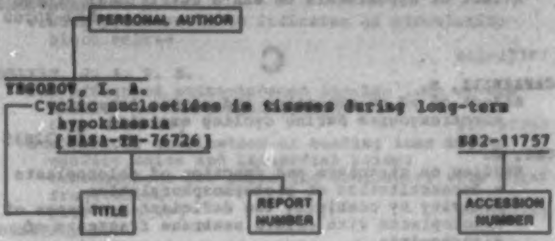

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 237)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in September 1982 in

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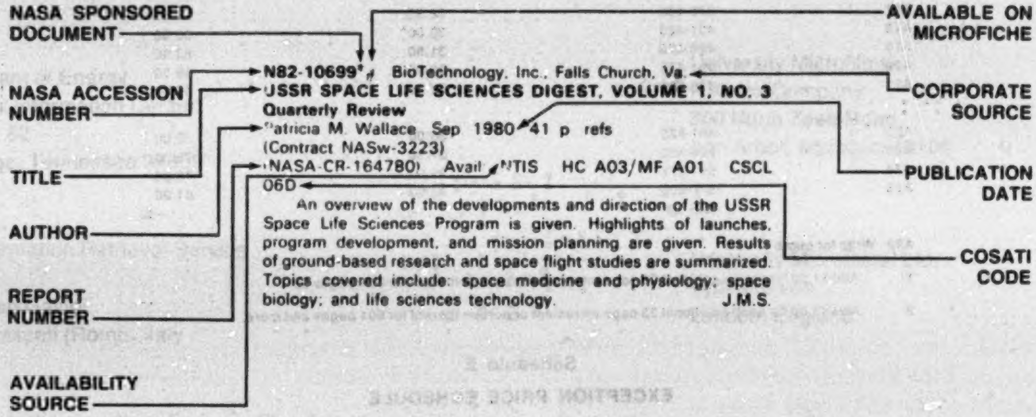

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N82-10699*# BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3 Quarterly Review**
Patricia M. Wallace Sep 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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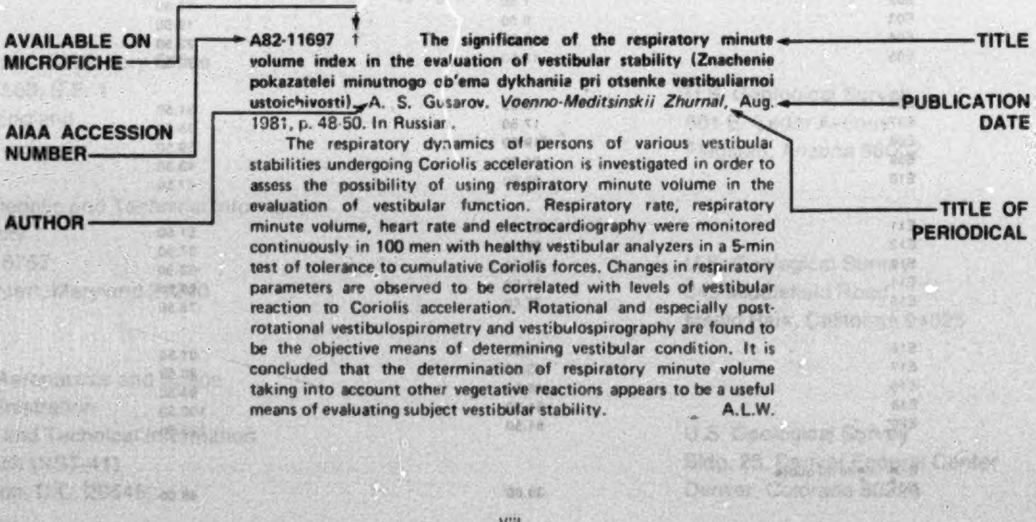

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A82-11697 † **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 237)*

OCTOBER 1982

## IAA ENTRIES

**A82-34965** **Simulation of two forms of eye motion and its possible implication for the automatic recognition of three-dimensional objects.** A. Roy (Zaragoza, Universidad, Saragossa, Spain) and L. L. Sutro. *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, May-June 198, p. 276-288. 30 refs.

Simulation of two forms of eye motion has been carried out with a view to developing automated means of recognizing regular three-dimensional objects from any direction. The visual system includes a binocular graded-resolution video camera assembly, a planner, and a self-command computer. The discussion covers the following topics: simulation of eye movement in tracking, design of a scan path generating algorithm, simulation of the generation of a scan path, detection and display of edges, design of adjustment-of-fixation algorithm, and simulation of adjustment of fixation. V.L.

**A82-34968** **Linguistic decision structures for hierarchical systems.** J. H. Graham and G. N. Saridis (Rensselaer Polytechnic Institute, Troy, NY). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, May-June 1982, p. 325-333. 13 refs. NSF Grant No. ECS-79-16882.

The development of a new hierarchical linguistic-based learning control structure for complex systems is described. The complete system will be able to interact with a human operator in a high-level language at the highest level of the hierarchy and will be able to control detailed motions of a complex physical system at the lowest level of the hierarchy. Each level of the hierarchy is defined by a formal grammar which can generate exactly the class of admissible control actions at that level. A new linguistic structure, the linguistic decision schema, is proposed to specify the mapping between linguistic elements in adjacent levels. In the most general form, the decision schema incorporates a learning algorithm to obtain asymptotically optimal mappings for control under stochastic environments. (Author)

**A82-34970** **Analysis and classification of human errors in troubleshooting live aircraft power plants.** W. B. Johnson (Illinois, University, Urbana, IL) and W. B. Rouse (Georgia Institute of Technology, Atlanta, GA). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, May-June 1982, p. 389-393. 12 refs. Contract No. MDA903-79-C-0421.

Two experimental studies were employed to develop and evaluate a scheme for classifying human errors in troubleshooting tasks. Both experiments involved trainees in a Federal Aviation Administration (FAA) certificate program in power plant maintenance. Each trainee received one of three training methods, two of which were computer-based, and then transferred to troubleshooting live aircraft power plants. The transfer data from the first experiment (N = 36) were used to develop the error analysis and classification procedures. In addition results of this analysis led to modifications of the training methods. The transfer data from the second experiment (N = 22) were employed to evaluate the effects of the changes in training methods. Results indicated a decrease in errors due to these changes. The development of the methodology is discussed and the resulting behavioral interpretations are presented. (Author)

**A82-34971** **A study on human tracking performance in a complex G field experiment.** D. W. Repperger, D. B. Rogers, J. W. Frazier, and R. E. Van Patten (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, May-June 1982, p. 393-401. 30 refs.

Various aspects of analyzing closed-loop tracking error within a phase plane context for a man-machine experiment are investigated. A study is conducted on candidate density functions that could characterize such boundaries. Using a cumulative distribution function (CDF), a definition of such a boundary is obtained. Kolmogorov-Smirnov (K-S) tests are performed on empirical data from an acceleration stress experiment to investigate certain assumptions concerning normality of the distributions of these boundaries. (Author)

**A82-35248** **Signal analysis at the periphery of the auditory system (Analiz signalov na periferii slukhovoi sistemy).** Edited by Ia. A. Al'tman. Leningrad, Izdatel'stvo Nauka, 1981. 136 p. In Russian.

Papers are presented on mechanisms of information processing at the peripheral parts of the auditory system. Particular consideration is given to the oscillatory properties of cochlea structures, digital simulation of the frequency selectivity of the basilar membrane, statistical methods of signal analysis in the processing of neuroelectrical data, and two-tone inhibition in the peripheral auditory system. B.J.

**A82-35272** **Human visual orientation.** I. P. Howard (York University, Toronto, Canada). Chichester, Sussex, England and New York, John Wiley and Sons, 1982. 704 p. 2184 refs. $66.50.

It is shown how information relevant to judgements about direction and orientation is dealt with in the visual system, starting at the most peripheral level and proceeding to higher levels in the nervous system. General concepts and terms are introduced, and theories and terminology are critically appraised. Topics discussed include visual acuity and associated optical and retinal mechanisms; neurophysiology of orientation detectors in the visual system; coding of spatial information; the relationship between vision and the vestibular, auditory, and kinaesthetic systems; visual motor coordination; and the judgement of orientation of shapes. Suggestions for future research are made. C.D.

**A82-35638** * # **United States and Soviet Life Sciences factors in long-duration space flights.** J. C. Sharp (NASA, Ames Research Center, Moffett Field, CA). In: Space manufacturing 4; Proceedings of the Fifth Conference, Princeton, NJ, May 18-21, 1981. New York, American Institute of Aeronautics and Astronautics, 1981, p. 403-405.

A general review of the Life Sciences issues affecting long-duration manned missions is presented. Descriptions and examples of the similarities and differences between the Soviet and U.S. life sciences programs are discussed. (Author)

**A82-35639** * # **Behavioral and biological interactions with confined microsocieties in a programmed environment.** H. H. Emurian, J. V. Brady (Johns Hopkins University, Baltimore, MD), J. L. Meyerhoff, and E. H. Mougey (U.S. Army, Walter Reed Army Institute of Research, Washington, DC). In: Space manufacturing 4; Proceedings of the Fifth Conference, Princeton, NJ, May 18-21, 1981. New York, American Institute of Aeronautics and Astronautics, 1981, p. 407-421. 22 refs. Grants No. NGR-21-001-111; No. PHS-DA-00018; Contract No. N00014-80-C-0467.

This paper presents a summary of the background, objectives, and methodological approach of an ongoing research project devoted to the analysis of individual and small group performance effectiveness under conditions of isolation and confinement during extended residences in a continuously programmed environment. A more detailed description is provided of the results of a recent series of experiments designed and conducted to assess hormonal and behavioral effects of a change in group membership and size. (Author)

**A82-35641** # **Influential factors of negative effects in the isolated and confined environment.** S. R. McNeal and B. J. Bluth (California State University, Northridge, CA). In: Space manufacturing 4; Proceedings of the Fifth Conference, Princeton, NJ, May 18-21, 1981. New York, American Institute of Aeronautics and Astronautics, 1981, p. 435-442. 28 refs.

Studies have been conducted on the isolated and confined environment (ICE) in order to identify potential problems for the space traveler. Maladaptive characteristics, both physical and psychological in nature, as well as individual and group behavior changes have been identified and it has been shown that the ICE symptomology is very similar to that of stress. It is suggested that the ICE acts as a catalyst to other factors of greater influence in the development of negative effects observed in an ICE. Stress management is discussed with reference to training, coping strategies, preparedness for social and psychological problems, and alterations of the social and physical environment. V.L.

**A82-35651 † Structural changes of the thymus of irradiated animals that were also subjected to heat trauma (Strukturnye izmeneniia timusa obluchennykh zhivotnykh, dopolnitel'no podvergshikhsia termicheskoi travme).** R. S. Budagov (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 278, 279. 5 refs. In Russian.

**A82-35652 † Investigation of the general fitness of the progeny of irradiated animals. III - The resistance of mice to irradiation, hypoxia, endotoxin, and physical stress (Issledovanie obshchei prisposoblennosti potomstva obluchennykh zhivotnykh. III - Ustoichivost' myshei k oblucheniiu, gipoksii, deistviiu endotoksina, fizicheskim nagruzkam).** I. E. Vorobtsova and K. L. Gol'zberg (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 261-264. 11 refs. In Russian.

**A82-35653 † Protective effect of a gaseous hypoxic mixture under the combined effect on the organism of radiation and physical stress (Zashchitnyi effekt gazovoi gipoksicheskoi smesi pri sochetannom vozdeistvii na organizm radiatsii i fizicheskoi nagruzki).** A. I. Britun, R. B. Strelkov, N. G. Kucherenko, and O. I. Kurochkina (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 250-252. 13 refs. In Russian.

**A82-35654 † The effect of several pharmacologically active substances on the transformation of cystamine in mouse tissues (Vliianie nekotorykh farmakologicheski aktivnykh veshchestv na prevrashchenie tsistamina v tkaniakh myshei).** L. G. Tarnopol'skaia. *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 246-250. 12 refs. In Russian.

The effect of mexamine, ethirone, and gutimine on the rate of cystamine transformation in the liver and spleen of white mice was studied. It is shown that, administered in combination with cystamine, these preparations decrease the rate of the sulfur-containing radio-protector metabolism. It is suggested that radio-protective drugs be produced on the basis of cystamine and include substances that have an effect on the pharmacokinetics of the sulfur-containing component. B.J.

**A82-35655 † Possibility of evaluating radiation injury to skin on the basis of changes in its functional state (Vozmozhnost' otsenki luchevogo porazheniia kozhi po izmeneniiu ee funktsional'nogo sostoianiia).** V. O. Sudakova and I. A. Rappoport. *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 226-229. 14 refs. In Russian.

Experiments on male rats have shown that the evaluation of the neutralizing capacity of the skin can be used as a quantitative method to study the functional status of the skin; this is the case because this evaluation makes possible an early disclosure of the impairment of the protective function of beta-irradiated skin. The neutralizing capacity of the skin is a direct function of the beta-radiation dose and may be a criterion for the prediction and assessment of the severity of radiation dermatitis. B.J.

**A82-35656 † Bone-marrow haemopoiesis in dogs exposed to various repeated total-body nonuniform irradiations (Kostnomozgovoe krovetvorenie u sobak pri razlichnykh variantakh povtornykh obshchikh neravnomernykh obluchenii).** M. P. Kalandarova and V. G. Gorlov. *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 215-219. 9 refs. In Russian.

Dogs were exposed to total-body nonuniform irradiation, the absorbed doses varying by 2.8 to 8 times and doses on the dog's back amounting to 0.0774 C/kg and 0.01290 C/kg. It is shown that, after a three-fold exposure at 90-day intervals between the fractions, a haemopoiesis affection develops which is analogous to that observed in the case of a typical form of radiation sickness induced by a single exposure. Long-term hypoplasia and aplasia of the bone marrow and the impairment of postirradiation recovery are indicative of the exhaustion of the haemopoietic resources upon repeated exposure to iunizing radiation. B.J.

**A82-35657 † Modeling of the recovery of cells from radiation damage and the principle of effective-dose reduction. I - Models of the recovery of cells after acute irradiation (Modelirovanie protsessov vosstanovleniia kletok ot luchevykh povrezhdenii i printsip umen'sheniia effektivnoi dozy. I - Modeli vosstanovleniia kletok pri ostrom obluchenii).** A. D. Andreev and Iu. A. Kutlakhmedov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii Rastenii, Kiev, Ukrainian SSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 187-193. 12 refs. In Russian.

**A82-35658 † Comparative evaluation of the efficiency of radio-protectors on the basis of criteria of the protection of bone marrow and the gastrointestinal tract (Sravnitel'naia otsenka effektivnosti radioprotektorov po kriteriiam zashchity kostnogo mozga i zheludochno-kishechnogo trakta).** N. N. Piatovskaia and I. E. Brumberg (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 183-186. 14 refs. In Russian.

Gamma-ray experiments on mice have shown that, unlike cystamine, 4-aminobenzo-2,1,3-thiadiazol has a radio-protective effect on the haemopoietic tissue and fails to protect the gastrointestinal tract. In the bone marrow, this preparation is effective only in regard to stem cells. B.J.

**A82-35659 † Investigation of the radio-protective effect of cystamine on a model of thermally induced prophage lambda (Izuchenie radiozashchitnogo deistviia tsisteamina na modeli termoindutsiruemogo profaga lambda).** S. E. Bresler, V. L. Kalinin, and I. N. Suslova (Akademiia Nauk SSSR, Leningradskii Institut Iadernoi Fiziki, Gatchina, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 176-182. 12 refs. In Russian.

Lethal and mutagenic effects of Co-60 gamma rays on the prophage lambda c 1857 in lysogenic E. coli cells AB1186 uvrA6 and AB2463 recA13 after irradiation in the absence or in the presence of cystamine (0.05 M) were investigated. Cystamine was found to produce a marked radio-sensitizing effect, with the prophage thermally induced immediately after irradiation (DMF = 1.5). In this case, the yield of gamma-radiation-induced c-mutations was significantly higher in the presence of cystamine than in its absence in AB1186 but not in AB2463 (which was deficient in SOS repair). When the prophage was thermally induced after 90 minutes of postirradiation incubation in broth neither the survival nor the yield of c-mutations depended on the presence of cystamine at the time of exposure or on the presence of the recA+ gene product. B.J.

**A82-35660 † Investigation by means of a fluorescent probe of changes in cellular membranes of fibroblasts of the Chinese hamster under laser and X-ray irradiation (Issledovanie izmenenii kletochnykh membran fibroblastov kitaiskogo khomiachka pri lazernom i rentgenovskom oblucheniiakh s pomoshch'iu fluorestsentnogo zonda).** A. K. Abdvakhitova, I. M. Parkhomenko, and T. N. Sokolova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Radiobiologiia*, vol. 22, Mar.-Apr. 1982, p. 155-159. 11 refs. In Russian.

**A82-35661 † Structural changes of the plasmatic membrane under the effect of ionizing radiation (Strukturnye izmeneniia plazmaticheskoi membrany pod deistviem ioniziruiushchei radiatsii).** B. S. Fomenko and I. G. Akoev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Uspekhi Sovremennoi Biologii*, vol. 93, Mar.-Apr. 1982, p. 183-195. 137 refs. In Russian.

**A82-35662 † Kainic acid as a tool in brain research (Kainovaia kislota - sredstvo issledovaniia golovnogo mozga).** I. A. Sytinskii (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) and V. S. Turovskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Uspekhi Sovremennoi Biologii*, vol. 93, Mar.-Apr. 1982, p. 253-269. 123 refs. In Russian.

Data are presented on the neurotoxicity of L-kainic acid, a structural analog of L-glutaminic acid, and the use of kainic acid as a specific tool in neurobiological research is discussed. Kainic acid destroys nerve cells in the injection zone without any damage to axons having endings in this particular part of the brain or extending across it. The specific effect of kainic acid is used for determining neuroanatomical connections and neurochemical indices of functional systems located in specific portions of the brain as well as for identifying changes in animal behavior due to nerve damage. V.L.

**A82-35663 † Evolutionary significance of the adaptation of animals to heat (Evoliutsionnoe znachenie temperaturnykh adaptatsii zhivotnykh).** B. P. Ushakov (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Uspekhi Sovremennoi Biologii*, vol. 93, Mar.-Apr. 1982, p. 302-319. 36 refs. In Russian.

The ability of a population as a whole to achieve physiological homeostasis aimed at preserving the population size and genetic structure in the case of a rise in temperature to a dangerous level is discussed. Physiological homeostasis of a population is realized through a reactive increase in the thermal stability of individual animals in response to an increase in ambient temperature. While the reactive increase in thermal stability results in reduced elimination of individuals, it also leads to reduced efficiency of selection due to heat. This may result in insufficiently selective or completely nonselective death of individuals. V.L.

**A82-35664 † Early diagnosis of overstrain of the cardiovascular system in athletes engaging in cyclic forms of sport (Ranniaia diagnostika perenapriazheniia serdechno-sosudistoi sistemy u sportsmenov tsiklicheskikh vidov sporta).** V. G. Kukes, V. A. Siluianova, S. N. Popov, E. V. Sokova, B. R. Al'perovich, V. V. Gorodetskii, A. M. Alaverdian, and L. S. Blistanova (I Moskovskii Meditsinskii Institut; Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Sovetskaia Meditsina*, no. 4, 1982, p. 18-21. 20 refs. In Russian.

The effects of a beta blocker on values of the general work capacity, gas exchange, acid-alkali balance, lactic acid level, and central body temperature were studied in 74 athletes subjected to a bicycle-ergometer exercise until fully tired. A vegetative-provision tension (VPT) manifested itself in a marked economizing effect of the drug on these parameters. It is shown that negative EKG changes in response to this effect are associated with the VPT syndrome. The elevated VPT which is accompanied by energy losses in the form of heat may lead to the development of dystrophic changes in the myocardium. B.J.

**A82-35665 † The combined effect of medicines (Kombinirovannoe deistvie lekarstvennykh veshchestv).** A. N. Kudrin (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Sovetskaia Meditsina,* no. 4, 1982, p. 89-94. 17 refs. In Russian.

Several mechanisms of the combined effect of drugs on the human body are examined. These include: (1) the direct interaction of drug molecules with one another; (2) the change in the pharmacokinetic properties of drugs; (3) metabolic incompatibility; (4) the competition of drugs for sites of binding with biomolecules; and (5) changes of the pharmacodynamics of drugs. B.J.

**A82-35666 † Changes of the oxygen transport function of the blood and some metabolic values in patients with hypertension and chronic ischemic heart diseases during ergometric exercise (Izmenenie kislorodtransportnoi funktsii krovi i nekotorykh pokazatelei metabolizma u bol'nykh gipertonicheskoi bolezn'iu i khronicheskoi ishemicheskoi bolezn-'iu serdtsa pri ergometrii).** V. N. Popova, I. L. Beketova, B. A. Malikov, and L. A. Evstigneeva (II Moskovskii Meditsinskii Institut; Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Vrachebnoe Delo,* Apr. 1982, p. 56-61. In Russian.

**A82-35667 † The determination of capillary resistance (Ob opredelenii rezistentnosti kapilliarov).** L. K. Dzhogan (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Gigieny i Toksikologii Pestitsidov, Polimernykh i Plasticheskikh Mass, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Apr. 1982, p. 64-66. 8 refs. In Russian.

An objective method for studying the durability and permeability of capillaries in the skin is presented. The method is based on electrical pumping and a vacuum manometer to create a negative pressure of a known magnitude over an area of skin in the lower third of the forearm; computation of the quantity of petechiae produced allows the estimation of capillary resistance. Use of the present method in the evaluation of workers in forestry and the woodworking industry exposed to formaldehyde and styrene has demonstrated its usefulness in monitoring the course of treatment for contact dermatitis. A.L.W.

**A82-35668 † Investigation of the functional state of the central nervous system and the motor apparatus for various regimes of rest and physical exercise (Issledovanie funktsional'nogo sostoianiia ts. n. s. i dvigatel'nogo apparata v usloviiakh razlichnykh rezhimov otdykha i fizicheskoi nagruzki).** P. L. Levakovskii (Lutskii Gosudarstvennyi Pedagogicheskii Institut, Lutsk, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 31. In Russian.

**A82-35669 † Dynamics of blood flow rate in athletes upon changes in environmental conditions (Dinamika skorosti krovotoka u sportsmenov pri izmenenii uslovii uneshnei sredy).** P. K. Prusov, N. G. Kartashov, and N. K. Snesarev (Vitebskii Oblastnoi Vrachebno-Fizkul'turnyi Dispanser, Vitebsk, Belorussian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 29-31. 7 refs. In Russian.

The response of the blood flow rate of athletes and its daily and seasonal variation to changes in environmental and geographical conditions is investigated. The method of oxyhemometry was used to assess blood flow rates in the pulmonary-aural circulatory branch in adult track and field athletes under lowland conditions and in the 23 days following ascent to 1600 m altitude, and in swimmers aged 11 to 12 having relocated from their homes in the European part of the Soviet Union to Sakhalin Island. Blood flow is observed to accelerate in the initial period of altitude acclimatization, in geographically acclimatized persons in the winter and spring-summer periods, and following exercise training conducted for several days in a row. Blood flow slows during the period of reacclimatization to lowland conditions, and in the morning hours as compared with the evening. The demonstrated variability of blood flow rate is thus concluded to be a factor which must be taken into account in the evaluation of the state of training of an athlete. S.C.S.

**A82-35670 † Characteristics of hemapoiesis in athletes undergoing endurance-training (Osobennosti krovetvoreniia u sportsmenov, treniruiushchikhsia na vynoslivost').** L. A. Matvienko (Gomel'skii Politekhnicheskii Institut, Gomel, Belorussian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 27-29. 5 refs. In Russian.

**A82-35671 † Variation of the biomechanical characteristics of an 800-m run under the influence of fatigue (Izmenenie biomekhanicheskikh kharakteristik bega na 800m pod vliianiem utomleniia).** V. V. Tiupa, Iu. G. Travin, F. A. Guseinov, and F. P. Riabintsev (Moskovskii Institut Narudnogo Khoziaistva; Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 20-23. 9 refs. In Russian.

**A82-35672 † Discriminative biomechanical characteristics in middle-distance running (Diskriminativnye biomekhanicheskie kharakteristiki pri bege na srednie distantsii).** V. M. Zatsiorskii, N. A. Iakunin, and N. G. Mikhailov (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 14-17. 19 refs. In Russian.

The mechanical energy expended by middle-distance runners of varying ability is determined. The way in which the biomechanical characteristics (in particular, of vertical, horizontal, and total external mechanical work) change during middle-distance running is described. It is found that when long strides are taken and high speeds are involved, runners of great ability expend considerably less energy in displacing 1 kg of weight through 1 m than runners of lesser ability. Running 1,000 m entails an insignificant increase in the vertical work and moderate changes in the horizontal work performed. C.R.

**A82-35673 † Specialized laboratory for the educational and research activity of students and the psychodiagnostic study of athletes (Spetsializirovannaia laboratoriia dlia uchebno-issledovatel'skoi raboty studentov i psikhodiagnosticheskogo obsledovaniia sportsmenov).** A. G. Barabanov, O. N. Mazurov, S. V. Sumerkin, and S. G. Shinkarev (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 48, 49. In Russian.

**A82-35674 † An empirical equation of elementary motion (Empiricheskoe uravnenie elementarnogo dvizheniia).** P. N. Khlomenok, Zh. K. Kholodov, and A. P. Khlomenok (Moskovskii Oblastnoi Gosudarstvennyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1982, p. 12-14. 14 refs. In Russian.

An approach based on the black box method is used to obtain an empirical equation describing the motion of man. The approach involves experimental determination of the temporal characteristics of the repeated motion of man; selection, with the aid of an analog computer, of a simple model with the same temporal characteristics; mathematical description of the model, i.e., derivation of an empirical equation; and validation of the equation. The study has yielded a model described by a second-order linear differential equation with a delay term. The model can be used in simulators and for complex motion synthesis. V.L.

**A82-35676 † The diagnosis and treatment of heart-rhythm disorders - The role of intracardial electrophysiological investigation (Diagnostika i lechenie narushenii ritma serdtsa - Rol' metoda vnutriserdechnogo elektrofizicheskogo issledovaniia).** A. S. Smetnev, S. P. Golitsyn, and S. F. Sokolov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, May 1982, p. 38-42. 12 refs. In Russian.

Studies of electrophysiological mechanisms and diagnostic criteria for the more frequent reciprocal tachycardias are discussed: sino-atrial, atrial, atrioventricular nodal, tachycardias in Wolff-Parkinson-White syndrome, ventricular tachycardia, and rhythm disorder caused by automatic activity of the ectopic focus. The problem of assessing antiarrhythmic drugs is examined, along with the problem of the differentiated treatment of rhythm disorders. Finally, the role of electrophysiological studies in the choice of individual medicinal therapy for patients with heart arrhythmis is considered. B.J.

**A82-35677 † The role of stress in the pathogenesis of ischemic heart disease (Rol' stressa v patogeneze ishemicheskoi bolezni serdtsa).** F. Z. Meerson, M. G. Pshennikova, and A. A. Ugolev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, May 1982, p. 54-61. 47 refs. In Russian.

**A82-35678 † The first clinical experience with a new Soviet antiarrhythmic drug, the diethylamine analog of ethmosine, in patients with different disorders of the heart rhythm (Pervyi opyt klinicheskogo primeneniia novogo otechestvennogo antiaritmicheskogo preparata - dietilaminovogo analoga etmozina - u bol'nykh s razlichnymi narusheniiami ritma serdtsa).** Kh. Kh. Shugushev, A. S. Smetnev, L. V. Rozenshtraukh, and N. V. Kaverina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, May 1982, p. 71-75. In Russian.

**A82-35679 † The effect of nitroglycerine on the functional state of the left ventricle in patients with acute myocardial infarction according to ultrasonic studies of the heart (Vliianie nitroglitserina na funktsional'noe sostoianie levogo zheludochka u bol'nykh ostrym infarktom miokarda po dannym ul'trazvukovogo issledovaniia serdtsa).** L. O. Ivanishvili and I. Iu. Ashmarin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, May 1982, p. 91-96. 25 refs. In Russian.

**A82-35680 † Recent developments in assessing the myocardial dystrophy encountered in athletes as a consequence of chronic physical overexertion (Novoe v otsenke distrofii miokarda vsledstvie khronicheskogo fizicheskogo perenapriazheniia u sportsmenov).** E. V. Zemtsovskii and A. A. Uderman (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Kardiologiia*, vol. 22, Apr. 1982, p. 20-23. 9 refs. In Russian.

It is noted that the diagnosis of myocardial dystrophy in athletes is at present based exclusively on electrocardiographic criteria, that is, on detecting irregularities in the repolarization of heart ventricles. It is pointed out, however, that athletes subjected to extremely demanding regimens can develop heart rhythm disorders, the most common of which are extrasystole and arrhythmia of the 'suppressed sinoatrial node'. Since studies have shown that repolarization irregularities are often accompanied by heart rhythm disorders, it is thought that the latter may indicate myocardial dystrophy. The various types of dystrophy, which differ from one another in the changes that occur in the function and shape of the myocardium, are discussed. Attention is also given to the similarity in the changes that occur in indicators of myocardial shape and heart rhythms during ventricle repolarization irregularities and extrasystole and migration of the rhythm leader. The possibility of interpreting these irregularities in rhythm as symptoms of myocardial dystrophy is considered. C.R.

**A82-35681 † Electrocardiographic diagnosis of the chronic pulmonary heart (Elektrokardiograficheskaia diagnostika khronicheskogo legochnogo serdtsa).** L. N. Matveev (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Kardiologiia*, vol. 22, Apr. 1982, p. 26-30. 17 refs. In Russian.

**A82-35682 † The pharmocokinetic characteristics of trimecain as compared to lidocain in patients with myocardial infarction (Farmakokineticheskie kharakteristiki trimekaina v sravnenii s lidokainom u bol'nykh infarktom miokarda).** V. K. Piotrovskii, E. B. Smirnova, O. S. Riabokon', and V. I. Metelitsa (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, Apr. 1982, p. 62-65. 6 refs. In Russian.

**A82-35683 † Mechanisms of the development of hypersensitivity to strophanthin in experimental myocardial infarction and its pharmacological correction (Mekhanizmy razvitiia giperchuvstvitel'nosti k strofantinu pri eksperimental'nom infarkte miokarda i ee farmakologicheskaia korrektsiia).** E. I. Gendenshtein and L. N. Sernov (Mordovskii Gosudarstvennyi Universitet, Saransk, USSR). *Kardiologiia*, vol. 22, Apr. 1982, p. 65-69. 15 refs. In Russian.

**A82-35684 † Rare cases of serious disturbances in cardiac rhythm during a hypoxic functional test (O redkikh sluchaiakh tiazhelykh narushenii ritma serdtsa pri gipoksicheskoi funktsional'noi probe).** V. B. Malkin and V. I. Plakhatniuk. *Kardiologiia*, vol. 22, Apr. 1982, p. 92-95. 23 refs. In Russian.

Cases of reversible heart stoppage in persons undergoing hypoxia at simulated altitude to measure cardiovascular adaptive capabilities are presented. Tests were performed on apparently healthy men breathing a hypoxic gas mixture at a simulated altitude of 5000 m while EKGs, arterial pressure, EEGs, respiratory rate and general condition were monitored. In about 6% of the subjects examined, physiological changes characteristic of unstable, ineffective adaptation were found, which were marked in about 3% by a pronounced bradycardia and disturbances in heart rhythm. In rare cases, sinus bradycardia was accompanied by ventricular asystole lasting from 3 to 34 sec. Sinus rhythm was restored by oxygen breathing in all but one case, where fibrillation developed. Sinus bundle arrest was also observed following sinus arhythmia at a normal heart rate. The disturbances are attributed to a breakdown in neurohumoral regulation under conditions of reduced hypoxia tolerance. The occurrence of the serious instances in apparently healthy subjects is argued to require the presence of a specially trained physician to stop the test and provide immediate aid in such situations. S.C.S.

**A82-35687 † Cultivation of the luminescent bacterium Photobacterium leiognathi with control by luminescence (Kul'tivirovanie svetiashchikhsia bakterii Photobacterium leiognathi s regulirovaniem liuminestsentsii).** V. V. Zavoruev and V. V. Mezhevikin (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Mikrobiologiia*, vol. 51, Mar.-Apr. 1982, p. 224-229. 8 refs. In Russian.

**A82-35688 † State of the hearing function in diesel locomotive crewmen (Sostoianie slukhovoi funktsii u pabotnikov teplovoznykh brigad).** M. M. Buzinnik, V. P. Nechiporenko, G. F. Boiarskii, and V. F. Chumakov (Donetskii Meditsinskii Institut, Donetsk; Kievskii Gosudarstvennyi Institut Usovershenstvovaniia Vrachei, Yasinovataya, Ukrainian SSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 17-20. 6 refs. In Russian.

**A82-35689 † The use of trenthalum in acute vestibulocochlear disorders in patients with meningococcal infection (Primenenie trentala pri ostrykh vestibulo-kokhlearnykh narusheniiakh u bol'nogo s meningokokovoi infektsiei).** R. M. Shaimardanov (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 76, 77. In Russian.

**A82-35690 † Postural vertigo as a specific symptom of Meniere's disease (Pozitsionnoe golovokruzhenie kak osobennost' proiavleniia bolezni Men'era).** G. G. Lapshina (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 75, 76. In Russian.

**A82-35691 † Classification of vestibular disorders as a function of the phase of the disease and the degree of vestibular compensation (Klassifikatsiia vestibuliarnykh narushenii v zavisimosti ot fazy bolezni i stepenii kompensatsii vestibuliarnoi funktsii).** N. S. Blagoveshchenskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 57-63. 7 refs. In Russian.

Consideration is given to factors other than the site of the lesion affecting the symptomology of vestibular disorders. On the basis of clinical evidence, it is shown that the severity of vestibular symptoms depends to a significant extent on the phase of the disease; whether acute, subacute, chronic or residual, and on the degree of compensation. Vestibular disorders are then divided into three groups as a function of these factors: (1) the decompensated stage with the predominance of whole brain stem vestibular symptoms, found in coma and the recovery from coma: (2) the decompensated state with the predominance of vestibular symptoms, in which an asymmetry is noted in vestibular tests and vestibulo-autonomic and vestibulo-sensory reactions are elevated; and (3) the compensated state, where vestibular reactions are symmetrical, experimental nystagmus is inhibited or normalized, and vestibulo-autonomic and vestibulo-sensory reactions are reduced. It is noted that whereas central vestibular syndromes may fall into any of the above classifications, peripheral vestibular syndromes are restricted to the latter two. S.C.S.

**A82-35692 † The use of nondamping sinusoidal rotation in the study of vestibular function (O primenenii nezatukhaiushchego sinusoidal'nogo vrashcheniia dlia issledovaniia vestibuliarnoi funktsii).** E. V. Lapaev and O. A. Vorob'ev. *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 11-17. 25 refs. In Russian.

The qualitative and quantitative characteristics of nystagmus induced in healthy persons by nondamping sinusoidal rotation are examined. Horizontal nystagmus was measured by electronystagmometry in 49 subjects aged 25 to 45 experiencing sinusoidal rotation in a rotating chair programmed for various angular velocities and accelerations. At rotation periods greater than 10 sec, the change in nystagmus direction is observed to occur before the pause between rotation in opposite directions, with the magnitude of the phase advance proportional to the rotational period. A definite asymmetry in the phase advance is observed in normal subjects, and a more marked asymmetry in persons with certain disorders. It is concluded that tests with nondamping sinusoidal rotation provide an additional means for characterizing the phase relation between the nystagmus reaction and the stimulus, allowing the study of vestibular function. S.C.S.

**A82-35693 † Characteristics of brain electric activity in different otoneurologic syndromes with vestibular asymmetry (Kharakteristika mozgovoi elektricheskoi aktivnosti pri razlichnykh otonevrologicheskikh sindromakh, protekaiushchikh s vestibuliarnoi assimmetriei).** Kh. Kolchev (B'lgarska Akademiia na Naukite, Tsentralna Laboratoriia za Izuchavane na Moz'ka, Sofia, Bulgaria) and Zh. Vasileva (Meditsinska Akademiia, Sofia, Bulgaria). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Mar.-Apr. 1982, p. 8-11. 9 refs. In Russian.

**A82-35694 † Some questions open to discussion in clinical labyrinthology (Nekotorye diskussionnye voprosy klinicheskoi labirintologii).** V. S. Olisov (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Jan.-Feb. 1982, p. 53-59. 45 refs. In Russian.

Various aspects of the clinical characteristics and course of dysfunctions of the labyrinth organs of the inner ear are discussed. Four principle classes of labyrinthine disturbances - acute, primarily nonrecurring labyrinthine attacks; recurring episodes of vertigo termed Meniere's disease or syndrome; short-duration episodes of vertigo triggered by specific circumstances; and positional vertigo are distinguished, and questions as to the nature, existence and etiology of Meniere's disease and Meniere's syndrome are considered. Attention is then given to cochleo-vestibular disturbances of peripheral origin, and the merits of the two sets of terms used to describe such conditions, i.e. labyrinthopathy and vestibular or cochleo-vestibular syndrome, are discussed. Further efforts necessary to achieve an acceptable classification system for labyrinthine disorders are then indicated. S.C.S.

**A82-35695 † Synchronized nystagmus calibrator (Sinkhronizirovannyi kalibrator nistagma).** I. B. Soldatov, L. N. As'kova, and R. M. Shaimardanov

(Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Jan.-Feb. 1982, p. 76, 77. 5 refs. In Russian.

A synchronized nystagmus calibrator is proposed in which neon lamps light up intermittently at intervals continuously adjustable from 1 to 4 sec, the calibrator can also be used with the central lamp remaining lit. High precision in the operation of the instrument, essentially a symmetric long-pulse multivibrator, is achieved by using a stabilized power source. The continuous adjustment feature makes it possible to synchronize the lighting of the lamps with periodic changes in the corneoretinal potential by adjusting the lamp switching period in accordance with the chart recorder motion. V.L.

**A82-35696** † **Affections of the upper respiratory tracts in transport-fleet sailors and the prophylaxis of these affections on long voyages (Zabolevaniia verkhnikh dykhatel'nykh putei u moriakov transportnogo flota i ikh profilaktika v dal'nem plavanii).** A. I. Akulinin, V. D. Dragomiretskii, L. M. Shafran, and O. V. Diumin (Odesskii Meditsinskii Institut; Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Odessa, Ukrainian SSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Jan.-Feb. 1982, p. 35-40. 12 refs. In Russian.

**A82-35697** † **Caloric methods for stimulation of the vestibular apparatus /Survey of the literature/ (Kaloricheskie sposoby stimuliatsii vestibuliarnogo apparata /Obzor literatury/).** V. I. Pivrikas. *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, Jan.-Feb. 1982, p. 80-85. 64 refs. In Russian.

**A82-35698** † **A day off in space (Vykhodnoi den' v kosmose).** P. Pelekhov (Gosteleradio SSSR, USSR). *Soviet Soiuz*, Apr. 1982, p. 20, 21. In Russian.

The ways in which cosmonauts arrange their personal time off from space tasks aboard the Salyut space stations are described. Attention is given to the frequent disruptions of rest time that characterize space flight, the choice of some cosmonauts to perform space tasks during their personal time, and housekeeping activities. B.J.

**A82-35700** † **Blood circulation in weightlessness (Krovoobrashchenie v nevesomosti).** O. G. Gazenko and A. M. Genin. *Zdorov'e*, no. 4, 1982, p. 10, 11. In Russian.

The characteristics of blood circulation under conditions of weightlessness are discussed. The effects of normal gravity on the circulatory system are first considered, with particular attention given to the gravitational distention of vascular walls and the necessary increase in blood volume to fill the expanded vessels. The absence of gravity is then shown to be accompanied by a contraction of the distended vessels in the lower extremities, the loss of the hydrostatic blood store and the shift of blood and intercellular fluids to the upper part of the body, resulting in an impairment in cerebral circulation, increased load on the right ventricle and an increased risk of pulmonary insufficiency. Mechanisms of decreasing circulating blood volume under weightless conditions are then examined, and it is noted that disturbances of hemodynamics have not posed any serious dangers to space flights. Finally, adaptations in hemodynamics necessary upon return to earth following an extended-duration space flight are discussed along with methods used in flight to prevent hemodynamic disturbances. A.L.W.

**A82-35768** **Conditioned tilt naming - A modified absolute judgment method is used to measure the oblique effect.** E. Matin, A. Drivas, and V. Valle (Long Island University, Greenvale, NY). *Perception and Psychophysics*, vol. 31, no. 5, May 1982, p. 421-428. 25 refs. Grant No. NIH-R01-EY-02951.

Two naive human observers were conditioned to report on the slant of a 3.8-cpd sinusoidal grating viewed monocularly with a light-adapted eye and presented at various orientations extending from -45 to +135 deg. The procedures used yielded a baseline measure of performance and measures obtained during conditioning, extinction, and reconditioning of the tilt-naming response. Both subjects learned rapidly, achieving a level of performance that permits efficient measurement of meridional differences in perceived orientation (the oblique effect) at a large number of angles. (Author)

**A82-35769** * **Mass estimation and discrimination during brief periods of zero gravity.** H. E. Ross (Stirling, University, Stirling, Scotland) and M. F. Reschke (NASA, Johnson Space Center, Neuroscience and Behavior Laboratory, Houston, TX). *Perception and Psychophysics*, vol. 31, no. 5, May 1982, p. 429-436. 30 refs. Research supported by the Medical Research Council of England.

Under zero gravity, the gravitational cues to mass are removed, but the inertial cues remain. A sensation of heaviness is generated if objects are shaken, and hence given a changing acceleration. A magnitude estimation experiment was conducted during the 0-G phase of parabolic flight and on the ground, and the results suggested that objects felt lighter under 0 G than under 1 G. Mass discrimination was also measured in flight, and yielded Weber fractions of .18 under 0 G, .16 under 1.8 G, and .09 under 1 G. Poor performance under microgravity and macrogravity was probably due mainly to lack of time for adaptation to changed G levels. It is predicted that discrimination should improve during the course of prolonged spaceflight, and that there should be an aftereffect of poor discrimination on return to earth. (Author)

**A82-35809** **The measurement of heart rate variability spectra with the help of a personal computer.** O. Rompelman, C. J. Van Spronsen (Delft, Technische Hogeschool, Delft, Netherlands), and J. B. I. M. Snijders (Staatsbedrijf der Posterijen, Telegrafie en Telefonie, Leidschendam, Netherlands). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, July 1982, p. 503-510. 14 refs.

The analysis of fluctuations in heart rate or heart rate variability (HRV) has found applications in, among others, the study of the neural cardiovascular system and ergonomic psychology. In particular, the study of the frequency components of HRV is becoming increasingly important. A method for the computation of HRV spectra directly from the heart beat event series as derived from the electrocardiogram has been developed. Because of the computational efficiency achieved, this method is implemented on a personal computer. Apart from an external QRS detector, a completely stand-alone system is realized. User interaction takes place on a menu card display basis. The system can operate at both real time and up to eightfold increased speed. The resultant spectra are displayed as histograms. Different ways of smoothing and segment averaging are possible. (Author)

**A82-35810** **Measurement of eye movement with a ferromagnetic contact ring.** Y. Y. Zeevi and J. Ish-Shalom (MIT, Cambridge, MA). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, July 1982, p. 511-522. 14 refs. Research supported by the United States-Israel Binational Science Foundation; Technion - Israel Institute of Technology, and Massachusetts Institute of Technology.

A new magnetic method for measurement of eye movement is presented. It is based on measurement of differential inductance variations of two C-shaped coils due to the movement of a conical ferromagnetic ring which fits on the sclera. High sensitivity over a wide dynamic range is obtained by using a tuned bridge and synchronous detector. Separation of the detector coils from the magnetic field source improves the resolution and stability, and enables a two-dimensional measurement with one pair of C-coils. (Author)

**A82-35811** **Auditory perception of radio-frequency electromagnetic fields.** C.-K. Chou, A. W. Guy (Washington, University, Seattle, WA), and R. Galambos (California, University, La Jolla, CA). *Acoustical Society of America, Journal*, vol. 71, June 1982, p. 1321-1334. 55 refs. U.S. Department of Education Grant No. G0080003029; Contract No. N00014-80-C-0354.

Absorption of pulsed microwave energy can produce an auditory sensation in human beings with normal hearing. The phenomenon manifests itself as a clicking, buzzing, or hissing sound depending on the modulatory characteristics of the microwaves. While the energy absorbed and the resulting increment of temperature per pulse at the threshold of perception are small, most investigators of the phenomenon believe that it is caused by thermoelastic expansion. In this paper, literature that describes psychological, behavioral, and physiological observations as well as physical measurements pertinent to the microwave-hearing phenomenon is reviewed. (Author)

**A82-35826** † **Physiological adaptations and maintenance of vegetative homeostasis (Fiziologicheskie adaptatsii i podderzhanie vegetativnogo gomeostaza).** A. D. Slonim (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 355-361. 41 refs. In Russian.

The current status of the theory of physiological adaptations is reviewed, and the basic premises underlying the study of such adaptations are examined. Attention is given to two fundamental mechanisms for the formation of stability: nonspecific, associated with the appearance of stress reaction; and specific, characterized by an increase and mutual substitution of functions maintaining homeostasis at all levels of physiological integration. Energy sources for adaptation and the involvement of systems of the organism in individual increases of stability are examined. A global energy factor of adaptation, applicable to the main physicogeographical regions, is developed. B.J.

**A82-35827** † **A classification of behavioral adaptation (Klassifikatsiia povedencheskoi adaptatsii).** V. I. Medvedev (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 362-374. 10 refs. In Russian.

A classification of the types of the behavioral adaptation of man is presented and briefly explained. Four main classes of such adaptation are delineated: (1) preventive (including overall change of activity, avoidance reaction, and active search for a preferendum); (2) stabilizational (including the conservation of the general structure of behavior and changes of the structure of behavior); (3) socially conditioned forms of behavior; and (4) psychologically conditioned forms of behavior (individual and group). B.J.

**A82-35828** † **Human adaptation in arid regions (Adaptatsiia cheloveka v aridnoi zone).** F. F. Sultanov and A. I. Freink (Akademiia Nauk

Turkmenskoi SSR, Ashkhabad, Turkmen SSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 375-388. 35 refs. In Russian.

Mechanisms of human adaptation to desert conditions are examined on the basis of a systems analysis of the complex of reactions developing under the effect of the natural climatic factors of the arid region on the organism. Groups of specific and nonspecific elements of urgent protection against overheating in desert conditions are delineated, and the interaction of these groups of elements is considered. The separation of factors into primary (directed at protection against overheating) and secondary (directed at the compensation of the effect of primary factors) makes possible a more adequate evaluation of the degree of adaptability of physiological processes in arid regions. A classification is presented of methods of acclimatization in arid regions, with allowance for the underlying physiological mechanisms. B.J.

**A82-35829** † **Stages of the adaptation of human lungs in conditions of the Far North (Stadii adaptatsii legkikh cheloveka v usloviiakh Krainego Severa).** A. P. Avtsyn and A. P. Milovanov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 389-398. 51 refs. In Russian.

A survey is presented of studies of respiratory adaptation to Arctic conditions. Several stages of adaptation are delineated which depend on various levels of bronchial permeability, ventilation, ventilation-perfusion relationships, and systolic pressure of the lung artery system: the stage of adaptive strain of the lungs (the first three to six months of living in the Far North); the stage of stabilization (after one-and-one-half to three years); the stage of adaptedness (three to ten or fifteen years); and the stage of deadaptation (which can occur during any of the aforementioned stages). Problems of developing a terminology for describing respiratory adaptation to Arctic conditions are considered, and possible future directions of Arctic pulmonology are discussed. B.J.

**A82-35830** † **Regional changes of pulmonary functions in inhabitants of the North (Regionarnye izmeneniia funktsii legkikh u zhitelei Severa).** L. N. Matveev, A. G. Marachev, and S. N. Medvedev (Moskovskii Meditsinskii Stomatologicheskii Institut; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 399-406. 36 refs. In Russian.

Tetrapolar rheopneumopulmonography was used to study ventilation and pulmonary circulation in 249 healthy persons: 162 from the northeastern USSR and 87 from Moscow. It is found that northerners, compared to Muscovites, have increased perfusion and ventilation of the middle zones constituting the functional reserve of the lungs, along with a decrease in the ventilation volume of the lower zones. Morphometric studies have shown a hypertrophy of the muscle layer at various bronchial levels. It is suggested that an increase in the volume of bronchial blood circulation is directed at the maintenance of the temperature-control effect of the respiratory tract. B.J.

**A82-35831** † **The bioenergetics of erythrocytes in inhabitants of the North (Bioenergetika eritrotsitov u zhitelei Severa).** A. G. Marachev, V. I. Sorokovoi, A. V. Kornev, L. N. Matveev, E. P. Brusovanik, and L. N. Khromov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 407-415. 48 refs. In Russian.

Tests were performed on 210 inhabitants of the Magadan region of the USSR in order to study the bioenergetics of erythrocytes under Arctic conditions. It is shown that the erythrocytes of the peripheral circulation of Arctic inhabitants have lower levels of ATF, common and reduced glutathione, and catalase and glutathione peroxidase activity than those of inhabitants of temperate regions. The lipids of erthrocyte membranes of Arctic inhabitants are characterized by an increased quantity of unsaturated fatty acids and a considerable increase in the rate of nonenzymatic peroxidation. Here the erythrocyte morphology is characterized by an increased cell size, a marked polymorphism, and increased echinocyte population. These results are discussed in the light of possible reasons for the premature aging of erythrocytes. B.J.

**A82-35832** † **The hemostasis system in man in high-altitude conditions (Sistema gemostaza u cheloveka v usloviiakh vysokogor'ia).** V. A. Isabaeva and T. A. Ponomareva (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 416-430. 68 refs. In Russian.

The literature of functional changes of the human hemostasis system in high-altitude conditions is reviewed. A detailed analysis is presented of variations of blood coagulation in cases of individual adaptation to various high-altitude regions (Tien Shan, Pamir, the Caucasus, and the Himalayas). It is shown that the adaptive reaction of hemostasis is a phase process of hyper/hypocoagulational character. A systematic review is presented of data on the role of separate components of the hemostasis system (procoagulants, anticoagulants, thrombocytes, and fibrinolysis), and their interrelationships in the case of chronic high-altitude hypoxia. The role of hemostasis as an important homeostatic system in adaptation to high-altitude conditions is emphasized. B.J.

**A82-35833** † **Psychophysiological analysis of periodic oscillations of performance quality within the limits of a work cycle (Psikhofiziologicheskii analiz periodicheskikh kolebanii kachestva deiatel'nosti v predelakh trudovogo tsikla).** G. M. Zarakovskii, A. M. Karpukhina, and V. A. Salamatov (Ministerstvo Prosveshcheniia Ukrainskoi SSR, Nauchno-Issledovatel'skii Institut Psikhologii, Kiev, Ukrainian SSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 431-444. 31 refs. In Russian.

The paper examines the theoretical principles underlying experimental results on periodic oscillations of various quality indices of work performance and the level of the nonspecific activation of the central nervous system. It is suggested that oscillatory processes within the limits of a work cycle have a compensatory-adaptive character, providing for the maintenance of the necessary working level of the functioning of various physiological and psychic systems by the alternation of the degree of their activation. A practical result of the present study may be an increase in the reliability of the monitoring of the vigilance level of human operators. B.J.

**A82-35834** † **Omega potential: Quantitative index of states of brain and organism structures. I - The physiological significance of the omega potential when it is recorded from deep structures and from the scalp (Omega-potentsial: Kolichestvennyi pokazatel' sostoianii struktur mozga i organizma. I - O fiziologicheskoi znachimosti omega-potentsiala pri registratsii ego s glubokikh struktur i s poverkhnosti kozhi golovy).** V. A. Iliukhina (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 450-456. 20 refs. In Russian.

**A82-35835** † **Fatigue and the adaptive possibilities of the organism during work (Utomlenie i adaptatsionnye vozmozhnosti organizma v protsesse truda).** B. N. Petukhov, N. S. Udarova, O. A. Likhacheva, and L. P. Stepanova (Goskomtrud SSSR, Nauchno-Issledovatel'skii Institut Truda, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 457-462. 13 refs. In Russian.

Experimental results are presented concerning the adaptation of the human body to various elements of a work environment. Physiological and psychological studies relating to work-related fatigue were made on beginning workers and experienced workers. It is found that the incidence of fatigue among the former is more marked than among the latter. Particular attention is given to those types of work wherein only moderate fatigue arises, and workers become physiologically and psychologically adapted to the conditions of their work, developing a general nonspecific resistance. B.J.

**A82-35836** † **Evaluation of the functional state existing in the adaptation to high-altitude conditions (Otsenka funktsional'nogo sostoianiia pri adaptatsii k usloviiam vysokogor'ia).** A. D. Aidaraliev, V. M. Iakovlev, and D. M. Imanaliev (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 463-468. 16 refs. In Russian.

Tests were conducted on marathon runners during 1979-1980 as they were training on flat land and in medium- and high-altitude conditions (1700 and 2800 meters above sea level) in order to study their adaptation to high-altitude conditions. The adaptive responses were analyzed on the basis of Baevskii's index, characterizing strain placed on the bioregulation systems; the Arinchin-Sytin indices concerning the degree of stress on the heart and blood vessels; and the Mirrakhimov-Aidaraliev index concerning the quality of the adaptive response in high-altitude conditions. It is shown that these indices complement the general-physiological criteria for human adaptability to extreme physical stress in high-altitude conditions and make it possible to obtain information necessary for the compensation of individual loads. B.J.

**A82-35837** † **Strain on the regulation systems as a condition of successful adaptation to heat (Napriazhenie sistem reguliatsii kak uslovie uspeshnoi teplovoi adaptatsii).** A. T. Mar'ianovich (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 477-480. 11 refs. In Russian.

Experimental results are presented on the acclimatization of 14 healthy persons to a hot, dry environment. It is shown that the necessary conditions of successful adaptation to heat under discontinuous heat stress is a relationship between the time of exposure to the hot environment and periods between exposures that provides for a marked disruption of thermal homeostasis towards the end of the last exposure. It is also shown that the total duration of the series of discontinuous exposures, leading to a heightened tolerance to heat, is roughly equal to the time of adaptation in the case of continuous daily exposures lasting several hours. B.J.

**A82-35838** † **Seasonal variations of human cardiorespiratory indices in the North (Sezonnye izmeneniia kardiorespiratornykh pokazatelei u cheloveka na Severe).** V. G. Evdokimov and A. T. Ketkin (Akademiia Nauk SSSR, Institut Biologii, Syktyvkar, USSR). *Fiziologiia Cheloveka*, vol. 8, May-June 1982, p. 481-488. 36 refs. In Russian.

**A82-35839** † **Dependence of reactions of the organism to extremal factors on initial state (Zavisimost' reaktsii organizma na ekstremal'nye**

**faktory ot iskhodnogo sostoianiia).** V. P. Zagriadskii and Z. K. Sulimo-Samuillo (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, May-June 1982, p. 496-498. In Russian.

Reactions to physical stress, hypoxemia, and high environment-temperature were tested on two groups of subjects with different levels of initial indices of external respiration and of the cardiovascular system. It is shown that the initial value of the above indices in a state of relative rest determines the character of subsequent reactions. Thus, persons with initial indices at the upper limit of the physiological norm showed less marked reactions to the extremal factors and a longer period for their recovery than subjects whose indices were below this limit. It is suggested that the initial values of certain indices can be used to predict the reaction of the organism to various extremal factors. B.J.

**A82-35840** † **Rate of change of physiological functions as an index of the degree of adaptation (Skorost' izmeneniia fiziologicheskikh funktsii kak pokazatel' vyrazhennosti adaptatsii).** N. V. Zgoda (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, May-June 1982, p. 504-506. In Russian.

The possibility of using the rate of change of physiological functions as an index of the degree of human adaptation to some extremal condition is examined. It is shown that the rate of change of physiological parameters varies in a regular manner in the adaptation of hypoxia (which is used here as an example of an extremal factor) in the transition period as well as in the stabilization regime. It is therefore concluded that the rate of change of physiological functions can serve as an index of the degree of adaptation. B.J.

**A82-35901** **Head-temperature effects on physiology, comfort, and performance during hyperthermia.** S. A. Nunneley, D. C. Reader, and R. J. Maldonado (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 623-628. 23 refs.

The effects of head temperature on comfort, cognitive performance and reaction time, and body temperature are evaluated under hyperthermic conditions in subjects whose head and body temperatures were controlled separately by the use of liquid-conditioned garments. Subject performance on a manikin task, and skin, esophogeal and rectal temperatures were measured during two heating and cooling cycles incorporating all four possible combinations of head and body heating and cooling. The temperature of the cap covering the subject's head, which varied from 8 to 43 C, is found not to affect rectal temperature, however significantly altered the rate of change of the esophageal temperature. Head temperature is also observed to be a major determinant of subjective comfort as the temperature of the garment covering the body varied between 30 and 43 deg. Body heating tended to shorten reaction time and decrease accuracy, while head cooling reversed these trends. It is concluded that head cooling deserves serious consideration as a means for optimizing operator performance in hot environments. A.L.W.

**A82-35902** **Effect of dietary fat on pulmonary enzymes and toxicity during normobaric hyperoxia.** C. L. Schatte and M. M. Mathias (Colorado State University, Fort Collins, CO). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 629-632. 25 refs. Contract No. N00014-76-C-0437.

Weanling male rats were fed a semipurified diet containing 10, 20, 40 or 60% of calories as fat having a constant polyunsaturated/saturated fatty acid ratio of 0.7. After 21-28 days of feeding, animals from each treatment group were exposed to pure oxygen at one atmosphere absolute for up to 72 h. Some animals were sacrificed after 0 or 48 h of oxygen exposure and lung tissue analyzed for the activities of the hexose monophosphate shunt and prostaglandin dehydrogenase/reductase. Other animals were exposed to hyperoxia until death. With increasing dietary fat content, the pre-exposure activities of the two enzymes decreased and oxygen-induced mortality increased. There was no dietary effect on enzyme activities after 48 h of hyperoxia. It was concluded that both dietary fat content and the pre-exposure activity of prostaglandin dehydrogenase/reductase influenced the relative susceptibility to pulmonary oxygen poisoning. (Author)

**A82-35903** **Radiogenic changes in the behavior and physiology of the spontaneously hypertensive rat - Evidence for a dissociation between acute hypotension and incapacitation.** G. A. Mickley, H. Teitelbaum, G. A. Parker, F. Vieras, B. A. Dennison, and C. H. Bonney (U.S. Armed Forces Radiobiology Research Institute, Bethesda, MD). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 633-638. 31 refs.

The Armed Forces Radiobiology Research Institute's linear accelerator was used to expose rats to high-energy electron radiation. The purpose of the study was to investigate both radiogenic blood pressure and performance changes in a strain of rat bred for hypertension (spontaneously hypertensive rat: SHR) in order to determine if high blood pressure might attenuate early transient incapacitation (ETI). Although male SHRs experienced a severe drop in blood pressure, much of the data is inconsistent with the hypothesis that hypotension causes performance decrements. In an additional series of studies, blood volume and serum chemistry data were examined. Male SHRs were significantly higher than normotensive controls on several blood chemistry determinations. Exposure to ionizing radiation tended to enhance these differences. These results could not be explained on the basis of radiogenic blood volume fluctuations. B.J.

**A82-35904** * **Measurement of cardiopulmonary performance during acute exposure to a 2440-m equivalent atmosphere.** B. M. Levitan (NASA, Johnson Space Center, Physiological Performance Laboratory; Technology, Inc., Houston, TX) and M. W. Bungo (NASA, Johnson Space Center, Physiological Performance Laboratory, Houston, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 639-642. 17 refs. Contract No. NAS9-14880.

Each of 20 subjects (ranging in age from 18 to 38 years, 15 being male, five female) was given two Bruce Protocol symptom-limited maximum treadmill stress tests, breathing sea-level compressed air (20.9% O2) for one test and a 2440-m equivalent (15.5% O2) for the other. A significant difference was found to exist between measured VO2 max (p less than 0.0002) and exercise time (p less than 0.0004) for the two conditions. No significant differences were observed in heart rate or the recovery time to a respiratory quotient of less than 1. Hemoglobin saturation, as measured by an ear oximeter, averaged 95% for sea-level and 91% for the 2440-m equivalent gases. These results support a 2440-m equivalent contingency atmosphere in the Space Shuttle prior to donning a low-pressure suit for the purpose reducing nitrogen washout times. B.J.

**A82-35905** * **Investigation of the combined effects of bedrest and mild hypoxia.** J. M. Waligora, D. J. Horrigan, Jr., Michael W. Bungo, and J. Conkin (NASA, Johnson Space Center, Environmental Physiology Laboratory, Houston, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 643-646. 11 refs.

Subjects were exposed to an 8-h mild hypoxia exposure (8000 ft. equivalent, 2438 m) with and without a 28-h period of 6 deg headdown bedrest. Anticipated responses to the bedrest and the hypoxia were observed. There was no indication that bedrest affected the arterial oxygenation or the oxygen gradient across the lungs of the subjects undergoing mild hypoxia. It is concluded that there is no evidence that would preclude an alveolar O2 pressure as low as 69 torr during contingency spacecraft operation. (Author)

**A82-35906** **Postural stability during slow-onset and rapid-onset hypoxia.** D. E. Holness, W. D. Fraser, D. E. Eastman, J. A. G. Porlier, and M. A. Paul (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 647-651. 21 refs.

The standing steadiness and postural tremor of seven male volunteers were examined during slow and rapid induction of hypoxia. Spectrum analysis of position coordinates and tremor data generated from a quartz multicomponent force measuring platform and a tremor transducer showed that postural tremor and anteroposterior sway increased significantly during hypoxia. Rate of onset of hypoxia, however, did not affect the development of the increased tremor, whereas rapid-onset hypoxia consistently induced a greater anteroposterior sway than slow-onset hypoxia. Lateral sway was not affected by either slow- or rapid-onset hypoxia; however, it was significantly greater when eyes were closed compared to when they were opened. Anteroposterior sway was also significantly greater when visual cues were eliminated during both slow- and rapid-onset hypoxia. Heart rate and cardiac index of subjects increased significantly during both conditions of hypoxia. (Author)

**A82-35907** * **Effect of orthostatic stress on exercise performance after bedrest.** V. A. Convertino, D. J. Goldwater, and H. Sandler (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 652-657. 34 refs.

The cardiorespiratory responses to supine against upright exercise were compared to determine the orthostatic effects of gravity on exercise performance following bedrest. Five healthy male subjects underwent seven days of continuous bedrest. A deconditioning effect was manifested by significant increases in ventilation volume, carbon dioxide production, respiratory exchange ratio, heart rate, heart rate-pressure product, and diastolic blood pressure during submaximal exercise following bedrest. The major finding from this study was that bedrest resulted in a general decrease in exercise tolerance, which was more stressful in the upright posture compared to the supine position, judging from specific submaximal cardiorespiratory responses to cycle ergometry. The data support the hypothesis that there is an orthostatic factor to the reduction in work tolerance following bedrest deconditioning, in addition to the effects caused by increased physical activity. B.J.

**A82-35908** **Pulmonary oxygen toxicity - Possible role of ammonia in desorbing lung surfactant.** B. A. Hills (Texas, University, Houston, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, July 1982, p. 658-662. 27 refs.

A porous membrane has been synthesized from a fine-weave cotton fabric carboxylated to simulate the fixed negative charges in the alveolar wall. When this membrane is treated with pulmonary surfactant in physiological concentrations, especially dipalmitoyl lecithin, it loses its fluid permeability and can support a pressure of physiological saline of over 272 torr without bursting through. When the saline is replaced by isotonic ammonium chloride solution, the average penetration pressure is reduced to 187 torr. These data are examined in regard to the known production of ammonia upon hyperbaric exposure and the competition of the resulting positive ammonium ions for the negative sites on the alveolar wall previously occupied by the positive quaternary ammonium ions of the effectively cationic lung surfactant. Successful replacement must then promote edema formation. This is proposed as a possible mechanism for the indirect (blood-borne) effect of oxygen upon the lung. Thus, it is suggested that the indirect route for pulmonary oxygen toxicity could be mediated through the ammonia produced in significant quantities in many organs when the body is exposed to excessive oxygen and that one possible mechanism is competitive desorption of surfactant at the alveolar wall. B.J.

**A82-35909** **Regional blood flow in the domestic fowl immediately following chronic acceleration.** W. J. Weidner, L. F. Hoffman, and S. D. Clark (California, University, Davis, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 666-669. 18 refs. Research supported by the American Heart Association.

Chickens were centrifuged at +2Gz for 30-61 d in order to examine the effects of chronic low-G acceleration on blood flow distribution and cardiac output. The chickens were anesthetized after removal from the centrifuge and surgically prepared in order to measure cardiac output and regional blood flows by the reference sample method with Sr-85 labeled microspheres. Regional blood flows to the kidney, eyes, and skeletal muscle were significantly increased in animals subjected to chronic +2Gz as compared with noncentrifuged control animals. While the mechanism by which these increases in blood flow occurred is not known, results indicate that chronic exposure to hyperdynamic gravitational fields can alter circulatory dynamics. It is concluded that the cardiovascular system is directly involved in the process of adaptation to chronic positive acceleration. B.J.

**A82-35910** **The landing signal officer - Auditory aspects.** R. M. Robertson, D. W. Maxwell, and C. E. Williams (U.S. Naval Aerospace Medical Center, Naval Aerospace Medical Research Laboratory, Pensacola, FL). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 670-675. Navy-supported research.

Landing signal officers (LSOs), exposed to high noise levels during carrier operations, do not routinely wear hearing protectors. Noise exposure data obtained during carrier qualifications on the USS Lexington and the USS Forrestal suggested a clear risk for hearing damage. Moreover, a comparison of the hearing of LSO and non-LSO pilots matched for age and number of flight hours, indicated a trend for LSOs to have poorer hearing. Questionnaire data from 225 LSOs indicate they need full access to aircraft auditory cues, which is not attainable with current off-the-shelf hearing protectors. It is recommended that a hearing protector be developed for the LSO which would permit passage of critical auditory cues and, at the same time, provide hearing protection. There should be a redesign or elimination of the UHF handset. If eliminated, a boom-type noise-cancelling microphone in conjunction with earphones integral to the hearing protector should be considered. Additional hearing studies of LSO and non-LSO pilots should be undertaken. (Author)

**A82-35911** **A procedure for the analysis of nystagmus and other eye movements.** G. R. Barnes (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 676-682. 15 refs.

A simple procedure has been developed for the computer analysis of nystagmus and other eye movements using the superior pattern recognition capabilities of the human operator to distinguish between fast- and slow-phase eye movements. The basis of the procedure is that the operator can set up threshold limits around an expected slow-phase eye velocity waveform through the use of cursor facilities. Points lying outside the threshold limits are recognised as fast-phase eye movements and discarded. Various least-squares curve-fitting procedures are then used to establish the relationship between the occulomotor response and the stimulus waveform. Examples are given of analysis procedures for both periodic and transient responses of the vestibulo-ocular reflex. The method is particularly useful for the analysis of responses to voluntary head movement in which slow-phase velocity frequently approaches that of the fast-phase components. (Author)

**A82-35912** **Change in plasma cAMP and catecholamines in men subjected to the same relative amount of physical work stress.** P. C. Painter, E. T. Howley, and J. N. Liles (Tennessee, University; Memorial Hospital, Knoxville, TN). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 683-686. 19 refs.

This study has shown, for the first time, that the change in plasma adenosine 3',5'-cyclic monophosphate (cAMP), from accommodation or trough levels, correlates highly in both progressive and continuous work stress experiments with epinephrine at 0.990 and 0.898, and norepinephrine at 0.954 and 0.927, respectively, in men subjected to the same relative, rather than absolute, stress levels. All three analytes increased significantly by the time each subject had reached 80% of his maximal oxygen uptake in the progressive experiments and after working at 80% of his maximal oxygen uptake continuously for 10 min. In no case did plasma cAMP rise before the catecholamines. The possible significance of these observations to net perceived relative physiological stress is discussed. (Author)

**A82-35914** **Inflight medical facilities.** G. R. W. Davies and P. R. Degotardi. *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 694-700. 34 refs.

The need and facilities currently provided for emergency medical care aboard airliners are reviewed, with particular emphasis on the Australian situation. Available evidence suggests that there is no requirement for revising the first-aid equipment and practices of Australian domestic airlines. For long-haul services, there does appear to be a justification for a higher level of medical facility because of the duration of separation and at least a hypothetical increase in risk due to factors such as mild hypoxia, immobility, and dehydration. However, the contents of the present Quantas physicians' kit has proved adequate to cover most contingencies and any extra effort toward improvement of inflight emergency care should first be directed toward an improved working area. B.J.

**A82-35915** **Health advice for aircrew on refugee flights.** J. S. Keystone and L. McIntyre (Toronto General Hospital, Toronto, Canada). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 701-703. 16 refs.

Airlines involved in transporting Indochinese refugees from Southeast Asia were surveyed in order to assess measures to protect the health of crews on refugee flights. Five of the 20 airlines surveyed provided sufficient data for analysis; combined, the five airlines transported approximately 2500 refugees on more than 100 flights, involving at least one crew change per flight. It is found that the aircrew on the flights surveyed were improperly advised regarding immunizations and were overly protected against enteric infections where hand washing to prevent the transmission of disease would have been sufficient. Malaria chemoprophylaxis was inappropriate for some aircrew who were not exposed to malaria and unsuitable for personnel venturing into drug-resistant malarious areas. Disinfection of aircraft upon leaving Southeast Asia was not performed by most of the airlines surveyed, resulting in a potential public-health risk. Recommendations are made for future refugee flights. B.J.

**A82-35916** **Familial intermittent diplopia - A report of two cases.** S. F. Flynn, K. W. Welsh, and J. R. Dille (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine*, vol. 53, July 1982, p. 704-707. 16 refs.

The presence of sufficient muscle balance and bifovial fixation to prevent a break in fusion resulting in diplopia, even under conditions of hypoxia, fatigue, stress, and peripheral gaze, has been of concern in aviation medicine since 1917. Few breaks in fusion in flight have ever been reported, and most known cases of diplopia are from the history, not from test results. This paper describes a recent examination of a 54-year old subject (a civil-aviation employee, but not a pilot) with a five-year history of several daily episodes of incapacitating diplopia; in addition, there is information about his 48-year-old brother who has a similar history. When asymptomatic, both have normal vision test results. It is emphasized that detection was from the histories; the diagnosis remains uncertain. It is concluded that the ease of concealment, rare test value, and prevalent examiner skills are of concern; the importance of the history is reaffirmed. B.J.

**A82-36011** † **Contents of protein and amino acids in methanobacterial biomass (Soderzhanie belka i aminokislost v biomasse metanotrofnykh bakterii).** V. F. Gal'chenko, A. I. Nesterov, and M. V. Ivanov (Akademiia Nauk SSSR, Institut Biokhimii i Fiziologii Mikroorganizmov, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 264, no. 2, 1982, p. 494-496. 13 refs. In Russian.

**A82-36026** **Man at extreme altitude.** J. B. West (California, University, La Jolla, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1393-1399. 22 refs. Grants No. NIH-N01-HR-62915; No. NIH-R01-HL-24335.

The advance of knowledge of the effects of high altitudes on human life are traced through incidents and tests performed during hot-air balloon ascents and mountain climbing. Early balloon flights to heights exceeding 8000 m caused some fatalities, and 19th century discoveries included the importance of oxygen in low barometric environments. Blood samples were taken in mountain climbing expeditions in the 1920s, showing an alveolar CO2 partial pressure of 8 torr at 7010 m, which was later found to be half the actual value. The summit of Mt. Everest was reached for the first time by climbers without oxygen supplies in 1978. A different expedition up the slopes of Mt. Everest in 1973 resulted in the discovery that subjects who are acclimatized to heights do not return to sea level oxygen intake when supplementary oxygen is available. M.S.K.

**A82-36027** **Mechanical properties of the lungs during acclimatization to altitude.** H. Gautier, R. Peslin, A. Grassino, J. Milic-Emili, B. Hannhart, E.

Powell, G. Miserocchi, M. Bonora, and J. T. Fischer (Paris VI, Université, Paris; Nancy I, Université, Vandoeuvre-les-Nancy, Meurthe-et-Moselle, France; Meakins-Christie Laboratories, Montreal, Canada; Milano, Università, Milan, Italy). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1407-1415. 36 refs. Research supported by the Institut National de la Santé et de la Recherche Médicale.

Lung volumes and mechanics were examined in nine subjects at sea level and then on each day for six days at 3457 m altitude. Volume was recorded using a flow type plethysmograph, which was found to be insensitive to gas density variations. Chest spirograms were made, thoracic gas volume was measured, air way resistance was gaged with a pneumotachograph, and forced expiratory and inspiratory maneuvers were performed on or by each subject. Esophogeal pressure was also examined with a latex balloon-catheter system introduced through the nose for inflation in the stomach. A significant loss of the lung static recoil pressure was observed over the lung volume range of 60-90 percent, while the mean inspiratory flow increased from days 1-4 at altitude. The dynamic lung compliance was unaffected by altitude. Pulmonary flow resistance, however, decreased continuously to a value of 25 percent of day 1 on day 6. Further studies to detect if the time course of neural drive is altered at high altitudes are indicated. M.S.K.

**A82-36028** **Splanchnic vasoconstriction in heat-stressed men - Role of renin-angiotensin system.** P. Escourrou, P. R. Freund, L. B. Rowell, and D. G. Johnson (Washington, University, Seattle, WA; Arizona, University, Tucson, AZ). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1438-1443. 33 refs. Research supported by the Ministére des Affaires Etrongéres; Grants No. NIH-HL-16910; No. NIH-AM-25318; No. NIH-RR-37; No. NIH-GM-01160.

**A82-36029** **Effects of endogenous glucagon on glucose kinetics in shivering dogs.** Y. Minaire, J. Forichon, and A. Fréminet (Lyon I, Université, CNRS, Lyons, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1458-1463. 43 refs.

Seven female dogs were equipped with catheters for blood sampling, insulin injection, and somatostatin infusion, then sheared and tested in 25 and -21 C conditions. Doses of either the somatostatin, insulin, or normal saline with glucose were fed intravenously to the shivering dogs. Measurements included packed cell volumes, plasma glucose concentration, immunoreactive insulin and glucagon levels, and hepatic glycogen content. Plasma glucagon levels remained relatively constant in both temperature ranges, while glucose production doubled in the shivering canines, implying that glucagon is not the stimulus for increased glucose production. M.S.K.

**A82-36030** **An automated, indirect assessment of cardiac output during rest and exercise.** J. H. Wilmore, P. A. Farrell, A. C. Norton, R. W. Coté, III, E. F. Coyle, G. A. Ewy, L. P. Temkin, and J. E. Billing (Arizona, University, Tucson, AZ). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1493-1497. 28 refs.

A partial automation of the measurement of cardiac output through modification of the equilibration CO2 rebreathing technique was accomplished by using the Beckmann Metabolic Measurement Cart (MMC). The three variables, CO2 production, end-tidal CO2 pressure, and CO2 pressure in a rebreathing bag during the equilibration stage of the rebreathing procedure, were measured in breath-by-breath gas sampling in a sequence which repeated every 30 sec. Operator judgment was involved in deciding when the subject was in the same steady-state when each of the three variables was sampled. Six healthy subjects were examined to validate the procedure in comparisons of rest and cycle ergometer trials, and additional tests were run on eleven subjects with coronary artery disease using a thermodilution procedure with arterial catheterization. The thermodilution method was found to yield values 16.6 percent higher than the CO2 rebreathing technique. It is concluded that the method is viable for detecting suspected coronary disease when measurements are made in the supine position. M.S.K.

**A82-36031** **Parameters of ventilatory and gas exchange dynamics during exercise.** B. J. Whipp, S. A. Ward, N. Lamarra, J. A. Davis, and K. Wasserman (California, University, Medical Center, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1506-1513. 45 refs. Grant No. NIH-HL-11907.

The pulmonary gas-exchange and ventilatory response patterns during steady-state muscular exercise were examined in six subjects during cycle ergometer trials to establish characteristic exponential functions. Expiratory air was analyzed on a pneumatograph while O2 and CO2 partial pressures were assessed by mass spectrometry. The subjects performed six minutes of work and six minutes of rest in alternation after individual maximal workloads were determined. An early phase of response in terms of ventilation, O2 uptake, and CO2 output were detected which were different from patterns during steady-state conditions. The initial phase of rest to work exhibited higher cardiac output and pulmonary flow than the transition to steady state. A model was developed which fit the data once the steady-state plateau was reached. M.S.K.

**A82-36032** **Bohr effect and slope of the oxygen dissociation curve after physical training.** K. M. Braumann, D. Böning, and F. Trost (Hannover, Medizinische Hochschule, Hanover, West Germany). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1524-1529. 30 refs.

The influence of intensive training over a period of 6 mos on the hemoglobin-oxygen (Hb-O2) affinity in athletes was examined in terms of factors which alter the O2 dissociation curve. Eight athletes were tested during the off-season and the season, with Hb samples determined photometrically, and levels of 2,3 diphosphoglycerate, adenosine triphosphate (ATP), lactic acid, and the hematocrit value also assayed. Before and after comparisons for different levels of conditioning were examined statistically with the Student's test for paired samples. An increased Bohr coefficient was detected after physical training. No alteration of the Hb molecule was observed, while dissociation curves of young erythrocytes have a steeper slope than those of older red cells. An increase of Hb-O2 affinity was concluded to occur, implying greater O2 extraction from the blood in physically trained subjects. M.S.K.

**A82-36033 *** **Effects of horizontal body casting on the baroreceptor reflex control of heart rate.** G. E. Billman, D. T. Dickey, H. Sandler, and H. L. Stone (Oklahoma, University, Oklahoma City, OK). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1552-1556. 24 refs. Grant No. NsG-2262.

The purpose of this study was to investigate the effects of long-term horizontal body position on baroreceptor reflex control of heart rate. Six male rhesus monkeys (6.2-9.4 kg) were given bolus injections of 4.0 microgram/kg, phenylephrine during each of the following conditions: awake, anesthetized (10 mg/kg ketamine HCl), and after beta-blockade (1 mg/kg propranolol HCl) before, 7, 14, and 28 days after being placed in a horizontal body cast. R-R interval vs. systolic arterial pressure was plotted, and the slope was determined by least-squares-fit linear regression. Baroreceptor slope was significantly reduced by 7 days of horizontal body position and remained attenuated throughout the 28-day restraint period both before and after beta-receptor blockade. These data are consistent with the thesis that prolonged exposure to a zero-gravity environment impairs autonomic reflex regulation of the cardiovascular system. (Author)

**A82-36034** **Superficial shell insulation in resting and exercising men in cold water.** A. Veicsteinas, G. Ferretti, and D. W. Rennie (New York, State University, Buffalo, NY; Milano, Università, Milan, Italy). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1557-1564. 37 refs. Grant No. NIH-P01-HL-14414.

The results of studies of the insulation value of skin and subcutaneous fat layers in men at rest and during mild exercise while immersed in cold water are reported, together with data for whole-body insulation. Nine sedentary medical students of varying levels of measured subcutaneous fat experienced 3 hr in cool water while carrying a thermistor inserted beneath the skin and into the rectum. Heat flow was recorded, while the overall body insulation was calculated numerically by indirect calorimetry. Further trials examined the effects of exercise while immersed. Increasing fat thickness was found to provide higher overall body insulation, while exercise in cold water decreased the insular value of subcutaneous skin tissue. The unperfused skin and subcutaneous fat were concluded to furnish 10-15 percent of the whole-body insulation during immersion at rest, and up to 40 percent during exercise. M.S.K.

**A82-36035** **Evidence for diminished sensitivity of the hamster pulmonary vasculature to hypoxia.** B. R. Walker, N. F. Voelkel, I. F. McMurtry, and E. M. Adams (Colorado, University, Denver, CO). *Journal of Applied Physiology - Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1571-1574. 26 refs. Grant No. NIH-HL-14985.

**A82-36036** **Intrapulmonary blood flow redistribution during hypoxia increases gas exchange surface area.** R. L. Capen (Colorado, University, Denver, CO) and W. W. Wagner, Jr. (Colorado College, Colorado Springs, CO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1575-1580. 23 refs. Research supported by the Carnegie-Mellon Foundation; Grants No. NIH-HL-14985; No. NIH-HL-07171.

It was previously shown that airway hypoxia causes pulmonary capillary recruitment and raises diffusing capacity for carbon monoxide. This study was designed to determine whether these events were caused by an increase in pulmonary vascular resistance, which redistributed blood flow toward the top of the lung, or by an increase in cardiac output. Capillary recruitment at the top of the dog lung was measured by in vivo microscopy, gas exchange surface area of the whole lung by diffusing capacity for carbon monoxide, and blood flow distribution by radioactive microspheres. During airway hypoxia recruitment occurred, diffusing capacity increased, and blood flow was redistributed upward. When a vasodilator was infused while holding hypoxia constant, these effects were reversed; i.e., capillary 'derecruitment' occurred, diffusing capacity decreased, and blood flow was redistributed back toward the bottom of the lung. The vasodilator was infused at a rate that left hypoxic cardiac output unchanged.

These data show that widespread capillary recruitment during hypoxia is caused by increased vascular resistance and the resulting upward blood flow redistribution. (Author)

**A82-36037** **Exercise performance after ventilatory work.** B. Martin, M. Heintzelman, and H.-I. Chen (Indiana University, Bloomington, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1581-1585. 30 refs. Grant No. NIH-HL-26351.

The strength reserve of ventilatory muscles was tested by having subjects perform hyperpnea before spirometric tests on a treadmill. Instrumentation included channeling the subjects' breath through a chamber which allowed measurement of O2 uptake and CO2 levels in expirated air. Hyperpnea was maintained for 150 min, followed by running to exhaustion on a treadmill. Control trials were run before introduction of the pre-exercise hyperpnea to establish exhaustion levels on the treadmill. The exhaustion state was subsequently reached in a shorter time period once the deep breathing preceded the treadmill tests, occurring at lower levels of heart rate, ventilation, and O2 uptake than without the deep breathing. It is suggested that glycogen depletion occurs in the ventilatory muscles, a behavior similar to that of the skeletal muscles in exhaustive exercise conditions. M.S.K.

**A82-36038** **Effects of glycogen depletion and pedaling speed on 'anaerobic threshold'.** E. F. Hughes, S. C. Turner, and G. A. Brooks (California, University, Berkeley, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1598-1607. 34 refs. Grant No. NIH-AM-19577.

Efforts to determine whether the divergence between lactate and ventilatory inflection points are due to different gradients of pedaling speed and glycogen depletion in the muscles are reported. Nine subjects performed incremental work rate tests on a bicycle ergometer until maximal work rates were reached. Additional trials were run involving periodic pedaling at 50 rpm at levels just below the lactate inflection point. Inspired air volumes were measured on a potentiometer and blood samples were taken before the tests and within 2 minutes of the start of any load cycle. The decoupling of the ventilatory and lactate level inflection points occurred without any correlation to alterations in the pedaling frequency or body glycogen levels. An increase in ventilation was observed in the glycogen depletion tests, and correlations between the blood lactate and plasma bicarbonate indicate that lactate was the primary cause of exercise-induced acidosis. M.S.K.

**A82-36039** **Attenuation of blood pressure increases in Dahl salt-sensitive rats by exercise.** R. E. Shepherd, M. L. Kuehne, K. A. Kenno, J. L. Durstine, T. W. Balon, and J. P. Rapp (Toledo, University; Ohio, Medical College, Toledo, OH). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1608-1613. 33 refs. Research supported by the University of Toledo and American Heart Association; Grants No. NIH-AM-21912; No. NIH-HL-20176.

Female Dahl S and R rats were exposed to running training and salt augmentation in diet to determine the effect that chronically practiced physical activity has on blood pressure. The rats were divided into groups which either ran 27 m/min, 60 min/day, 5 days/week, for 8 wk on a treadmill, or did not run, or were trained for 12-24 wks, or began training 6 wks after the controlled diet was introduced and trained for 6 wks. Measurements were made of blood pressure by use of the microphonic tail-cuff method. S rats which ran exhibited lower blood pressures than all other groups of rats, while R rats displayed no differences in either sedentary or active groups. Hypertension was also lowered in the active S rats compared to the sedentary rats after salt was introduced to the diet, although rats with salt in the diet before exercise training never fully compensated for the addition of salt and concomitant onset of hypertension. M.S.K.

**A82-36040** **Effect of habitual exercise on left ventricular response to exercise.** J. D. Anholm, C. Foster, J. Carpenter, M. L. Pollock, C. K. Hellman, and D. H. Schmidt (Wisconsin, University; Mount Sinai Medical Center, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1648-1651. 30 refs.

Forty-five males in three levels of physical training were examined at rest and after maximal exercise by means of radionuclide angiography to assess the effect of regular exercise on left ventricular function. The subjects included groups which trained more than 7 hr/wk, 2-4 hr/wk, and less than 1 hr/wk in aerobic activity. The tests were performed to exhaustion on a bicycle ergometer while data was gathered by electrocardiogram and blood pressure measurements. Radionuclide angiograms were made at rest and after the trials. A high correlation was found between the left ventricle ejection rate (LVER) and work capacity. Resting values of left ventricular function were found to not depend on conditioning, while significant differences were observed for both LVER and ejection fraction. An expansion in the left ventricular dimensions was indicated in the well-trained group. M.S.K.

**A82-36041** **Sympathetic and parasympathetic cardiac control in athletes and nonathletes at rest.** P. G. Katona, M. McLean, D. H. Dighton, and A. Guz (Charing Cross Hospital Medical School, London, England; Case Western Reserve University, Cleveland, OH). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, June 1982, p. 1652-1657. 32 refs. Grant No. NIH-HL-20328.

The relative roles of intrinsic heart rate and neural factors which cause observed bradycardia in physically conditioned humans were examined in comparison with a control group of nonathletes. The relative shifts or increase of control activity by the parasympathetic and sympathetic nervous systems as a result of beta blocker introduction are discussed in terms of a numerical model weighted by contributions from the two neural systems. The subjects were injected with either propranolol or atropine sulfate to block the effects of one of the two systems to a degree which could be detected. Monitoring was carried out for heart rate, blood pressure, and respiration. No significant differences were detected in heart rate changes between the athletes and nonathletes. Evidence for a specific agent which causes reduced resting heart rates in athletes is discussed. M.S.K.

**A82-36172** † **The effect of acute hypoxia on the EEG and unit impulse activity of neurons of different brain structures in rats (Vliianie ostroi gipoksii na EEG i impul'snuiu aktivnost' neironov razlichnykh struktur mozga u krys).** N. S. Akopian, O. G. Baklavadzhian, and M. A. Karapetian (Erevanskii Gosudarstvennyi Universitet, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, May 1982, p. 576-582. 22 refs. In Russian.

The dynamics of the effect of acute hypoxia on the EEG and unit impulse activity of different brain structures in rats was experimentally investigated. The initial phase of hypoxia (2000-6000 m) involved the activation of the EEG and unit pulse activity, the EEG activity arising earlier and being more marked. In the second phase of hypoxia (7500-10,000 m), the EEG changed towards a predominant slow rhythm of delta type, while the unit impulse activity gradually diminished, the cortical neurons displaying a higher sensitivity to hypoxia and an earlier suppression than the cells of the hypothalamus and medulla. In all phases, the EEG waves showed a greater sensitivity to the rapid peripheral signals than the unit impulse activity of the cortex and other brain structures. B.J.

**A82-36229** **Cell-mediated immune reactions in ground squirrels in winter lethargy - Two-way transplantation reaction.** T. M. Shivacheva (B'lgarska Akademiia na Naukite, institut po Morpologiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 35, no. 2, 1982, p. 245-248. 12 refs.

The immunocompetency of the lymphoid cells of hibernating ground squirrels is investigated in experiments involving both graft-versus-host and host-versus-graft reactions. Immune reactions were evaluated according to the popliteal lymph node assay in nonhibernating ground squirrels injected with spleen cells from hibernating and nonhibernating ground squirrels and in hibernating animals injected with spleen cells from nonhibernating animals at various times of the year. The local transplantation reaction in nonhibernating squirrels immunized with cells from nonhibernating squirrels is observed to exhibit seasonal variations in intensity, while that for nonhiberating squirrels immunized with cells from hibernating animals is constant throughout the winter months at an intensity corresponding to the lowest intensity observed for nonhibernating squirrel spleen cells. Ground squirrels in deep hibernation did not develop the immune reaction. Results may be linked with the seasonal involution and involutive changes in the thymus, lymph nodes and spleen of ground squirrels. A.L.W.

**A82-36260** † **Superconducting magnetocardiograph (Sverkhprovodiashchii magnitokardiograf).** V. Fodel'. *Priroda*, June 1982, p. 107, 108. In Russian.

The first SQUID magnetocardiograph developed in the Soviet Union (at the Neutron Physics Laboratory of the Dubna Nuclear Research Institute) is briefly described, and its advantages in relation to conventional cardiographs are discussed. The magnetocardiogram, obtained using this instrument, of a healthy 35-year-old man is presented, and is found to clearly delineate the QRS complex and the T-wave. B.J.

**A82-36307** * **A specific radioimmunoassay for osteocalcin with advantageous species crossreactivity.** P. Patterson-Allen, C. E. Brautigam, C. W. Asling (California, University, San Francisco, CA), R. E. Grindeland, and P. X. Callahan (NASA, Ames Research Center, Moffett Field, CA). *Analytical Biochemistry*, vol. 120, 1982, p. 1-7. 17 refs. Grant No. NCA2-OR-665-004.

The specificities of immunoassays to rat and bovine osteocalcin are examined. Extracts of noncalcified tissues and tissue fractions are unreactive to the antibody, with the exception of the kidney, in which the reactive component appears to be identical with osteocalcin by gel filtration and dose dilution analysis. The assays, developed against protein isolated from bone, are also demonstrated to be reactive to the native protein (bone in situ) and to osteocalcin in serum. The assays are sensitive to less than 50 pg osteocalcin. Intra- and interassay coefficients of variation are less than 6.8%. The bovine antibody crossreacts with human, horse, monkey, baboon, and cat osteocalcin, while the rat antibody crossreacts with dog and mouse. (Author)

**A82-36319** **Gravity, and metabolic scale effects in mammals.** N. Pace (California, University, Berkeley, CA) and A. H. Smith (California, University, Davis, CA). *Physiologist*, vol. 24, no. 6, 1981, p. S-37 to S-40. 23 refs.

Scaling effects which occur in the increase of body size of mammals since the early Tertiary Period and which may be affected by interaction with a gravity field are discussed. The influence of gravitational loading is considered in terms of an allometric relationship between metabolic heat production rate and total body mass. It is noted that no explanation has been found for an observed 3/4 power low relationship between the rate and mass, although the body surface is known to increase as a 2/3 power of the body mass in mammals. Attention is given to properties of thermal conductance, metabolic intensity, and thermoregulation which requires a 1/2 power scaling with size. A compromise is asserted to have possibly occurred with the gravitational 1.0 power requirements. The design of experiments to place animals in a 2.5 g environment to find if the 1.0 power ratio can be induced are described. A shift in the power to a 1/2 value is indicated in a weightless environment. M.S.K.

**A82-36320 *** **An electron-microscopic study of the brain of the fruit fly, Drosophila melanogaster, exposed to high-LET krypton /Kr-84/ particle radiation.** F. E. D'Amelio, E. V. Benton (San Francisco, University, San Francisco, CA), L. M. Kraft, and J. Miquel (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Acta Neuropathologica*, vol. 57, 1982, p. 37-44. 14 refs. Grant No. NsG-2063.

**A82-36688** **Studies on the interaction of pemoline and centrophenoxine with some flight factors (Badania nad oddzialywaniem pemoliny i centrofenoksyny z niektorymi czynnikami lotu).** E. Marks and W. Swiecicki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 14, no. 4, 1981, p. 19-26. 7 refs. In Polish.

Two sets of experiments were performed on 160 male Wistar rats, weighing 180-200 g. The first set involved the effect of pemoline and two flight factors, i.e. hypobaric conditions and vibration, on the level of biogenic amines in the blood and brain tissue. The second set of experiments involved the effects of hypobaric conditions and vibration on the level of pemoline and centrophenoxine in the blood and brain tissue. Changes were found in the levels of these drugs under the effect of the flight factors, which suggested a change in the drug metabolism. B.J.

**A82-36689** **Electrophysical and hemodynamic factors conditioning cardiac arrhythmias during centrifuging (Elektrofizjologiczne i hemodynamiczne przeslanki do zaburzen rytmu serca podczas badania na wirowce przeciazeniowej).** L. Kopka, R. Dabrowa, and S. Bojenko (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 14, no. 4, 1981, p. 27-35. 26 refs. In Polish.

Various factors affecting the functioning of the human cardiovascular system during centrifuging under positive Gz acceleration are discussed. Particular attention is given to factors conditioning the occurrence of cardiac arrhythmias. Difficulties in interpreting such data are discussed with reference to aerospace medical studies. The necessity of making electrophysiological studies (using intracardial stimulation and His Bundle electrography) in some cases is pointed out. B.J.

**A82-36690** **The effect of positive and negative ions of air on the content of catecholamines in the brain and adrenal glands (Wplyw dodatnich i ujemnych jonow powietrza na zachowanie sie katecholamin w mozgowiu i nadnerczach).** R. Bernat, W. Banaszkiewicz, and G. Straburzynski (Akademia Medyczna, Poznan, Poland). *Postepy Astronautyki*, vol. 14, no. 4, 1981, p. 37-49. 27 refs. In Polish.

The content of adrenaline (A), noradrenaline (NA), and dopamine (DA) in the brain and adrenal glands of Wistar rats exposed to positive and negative air ions during 3.6 or 9 weeks was experimentally studied. Exposure to negative ions was found to produce a decreased NA content and an increased DA content in the brain. Positive ions produced an increase in the content of NA and DA in the brain. The content of A decreased in the adrenal glands of rats exposed to positive ions. B.J.

**A82-36691** **The effect of threat on psychomotor and intellectual performance depending on characteristics of temperament (Wplyw zagrozenia na efektywnosc funkcjonowania psychomotorycznego i intelektualnego w zaleznosci od charakterystyki temperamentalnej).** J. Maciejczyk (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 14, no. 4, 1981, p. 51-63. 10 refs. In Polish.

Studies were carried out to evaluate the performance of pilot candidates, both differentiated and nondifferentiated in traits of temperament, in regard to psychomotor and intellectual skills in threat situations. Threatful stress was produced by testing candidates on a centrifuge for the first time in their lives. The anxiety level was measured before and after centrifuging. It is shown that stress associated with the anticipatory danger situation significantly reduces the level of performances of psychomotor and intellectual tasks. No differences in psychomotor and intellectual performance was found in subjects differentiated according to traits of temperament. B.J.

**A82-36951** **Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980.** Conference sponsored by NATO. Edited by J. Moraal (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Instituut voor Zintuigfysiologie, TNO, Soesterberg, Netherlands) and K.-F. Kraiss (Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Anthropotechnik, Wachtberg-Werthhoven, West Germany). New York, Plenum Press (NATO Conference Series III: Human Factors. Volume 17), 1981. 496 p. $35.

Papers are presented in the areas of conceptual and analytical approaches, performance measurement and simulator design and evaluation in the design of manned systems. Specific topics include the proper incorporation of human factors in the design process, simulation languages used in manned systems design, eye movement measurements used in the evaluation of visual performance, techniques for electophysiological measurements, human movement analysis in workplace design, and the design of a programmable multiple flight simulator facility. A.L.W.

**A82-36952** **Methods - Past approaches, current trends and future requirements.** D. A. Topmiller (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 3-31. 8 refs.

The historical development, current technologies and practices and projected future directions of the discipline of human factors engineering are reviewed. The origins of the field in the United States in response to the increasing complexity of weapon systems in World War II and its initial development using the tools of experimental psychology are outlined, and limitations to the early design handbook approach and the improvements brought by the introduction of an interdisciplinary approach with influences from computer and information science are considered. Current trends in reference data source, experimental design, human-machine integration performance measurement, modelling, engineering design simulation and procedural technologies are then assessed based on responses to a questionnaire survey. Future requirements for methods, technologies and data bases for man-machine interface design and overall systems design are then discussed as derived from evaluations of human factors needs and projected shortfalls in computer technology. A.L.W.

**A82-36956** **The human operator simulator - An overview.** N. E. Lane (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA), M. I. Strieb (Analytics, Inc., Willow Grove, PA), F. A. Glenn, and R. J. Wherry. In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 121-152. 39 refs.

The structure and operational characteristics of the Human Operator Simulator (HOS), a model which combines evaluations of overall man-machine system performance with detailed simulations of operator functioning within the system, are reviewed. HOS is a collection of digital computer programs which allows for the simulation of a total system, including operator, hardware and software, and external data sources, performing a complex mission. Definitions of equipment characteristics and operator procedures are communicated to HOS through the Human Operator Procedures (HOPROC) language. The HOS model converts the generalized system defined by the HOPROC procedures into a simulation of a specific simulation event resulting in a time history of the event which is built up from the times required to execute detailed micromodels of information absorption, information recall, mental computation, decision making, anatomy movement, control manipulation and relaxation. The HOS system has been validated on levels corresponding to the descriptive capabilities of HOPROC language, the validity of the micromodels, part-task simulations and full-scale simulations. A.L.W.

**A82-36957** **SAINT, a digital simulation language for the study of manned systems.** G. P. Chubb (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 153-179. 21 refs.

The basic features of the SAINT (Systems Analysis of Integrated Networks of Tasks) simulation language for the digital modeling of manned systems are presented. Following a brief survey of the evolution of SAINT based on experience gained from the use of the Siegel-Wolf two-man operator simulation model, which viewed system performance in terms of operator activities over time, the character of SAINT is discussed, noting its capability of modeling the man, machine or both as discrete events, continuous events or both, and the three levels of SAINT constructs. Examples of five applications of SAINT to simple cases are presented which demonstrate the range of modeling issues that may be approached, and a more complex model which includes the effects of man on machine and vice versa is formulated for the example of aircraft position fix updating using radar imagery. Possible improvements which would facilitate SAINT applications are noted. A.L.W.

**A82-36959** **Statistical techniques for instrument panel arrangement.** W. W. Wierwille (Virginia Polytechnic Institute and State University, Blacksburg, VA). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 201-218. 28 refs.

Four important aspects of the problem of the proper arrangement of instruments on a panel are discussed. The first involves the relationships that exist among the various statistical factors associated with instrument panel arrangement. A definition of link values, which express the magnitude of direct eye transitions between two instruments, is presented which allows them to be derived from both the joint probability of transition from one instrument to another or the probability of fixation on a given instrument. The problem of record length estimation in the collection of eye fixation data is then addressed, and the double sampling and work sampling approaches are outlined. Consideration is then given to the subclasses of criteria that may be used for optimization and to the execution of the optimization process itself, which in all but the most complex cases may be performed by exhaustive search methods. Important problems remaining in the areas of control and control/display arrangement and in arrangement and formatting with CRT displays are indicated. A.L.W.

**A82-36960 A method for semi-automatic analysis of eye movements.** F. V. Schick and H. Radke (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Brunswick, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 221-234, 5 refs.

A semiautomatic method for the analysis of eye mark recording data obtained in studies of the eye-fixation points when the observer's head is allowed to move freely is presented. The method is used with videotape recordings of subject eye motions as determined from the reflection of a V-shaped spot of light off the cornea, and head movements as determined using a lens attached to the center of a face mask. In constrast to time-consuming manual methods for the analysis of the analog methods, and fully automatic analysis, both of which are not applicable in cases where individual visual targets are changing their positions, the semiautomatic method works with categories of visual targets rather than their exact locations. Information, corresponding to the dwell times and motion sequences of the eye point of regard in the target areas, is entered into a digital computer from the analog record by an observer depressing a switch corresponding to each visual area for the duration of the fixation. The semiautomatic method has been proven practicable in studies of the visual behavior of airline pilots performing flight tasks in a simulator. A.L.W.

**A82-36961 Narrowing of the visual field as an indicator of mental workload.** M. Voss (Fraunhofer-Institut für Informations- und Datenverarbeitung, Karlsruhe, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 235-250. 14 refs. Research supported by the Forschungsvereinigung Automobiltechnik and Bundesanstalt für Strassenwesen.

A method has been developed which uses peripheral visual performance as an indicator of mental workload due to the processing of central visual information. Peripheral vision is measured according to the detectability of a set of lights mounted in a special spectacle frame while the subject is performing the main visual task. Detection rate is measured as a function of presentation angle in the horizontal meridian, with the functional field defined by the presentation angle where 50% of the stimuli are detected, so that a narrowing of the functional field, or tunnel vision, may be observed. Experiments involving subject responses to eight streams of binary signals, performance in a driving simulator and automobile driving in an actual situation have demonstrated a decrease in the detectability of peripheral visual stimuli in the presence of increased visual workloads. A.L.W.

**A82-36962 Eye movement measurement in the assessment and training of visual performance.** H. Widdel and J. Kaster (Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Anthropotechnik, Wachtberg-Werthhoven, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 251-270. 41 refs.

Measurements of eye movements during a series of search tasks are presented which were used to evaluate the influences of training in a specific search pattern on search performance. Oculometer measurements were performed during searches for a target symbol among neutral symbols of various densities spread randomly over a screen before visual training, in the course of training sessions in exhaustive search with and without a visual aid, and following training. Search times are found to show a learning effect in subjects trained with the scan aid, and to increase with symbol density. No significant differences in fixation duration are found between the pre- and post-test situations, although individuals with a high performance level generally exhibited a shorter fixation duration than those with lower performances. Estimations of the visual lobe area according to the probability of successful fixations in a given area show a more efficient visual lobe area for subjects with higher search performance than those with lower performance. Finally, measurements of eye movement patterns show a qualitative difference between the groups trained with and without a scan pattern, reflecting search performance. A.L.W.

**A82-36963 Physiological monitoring and the concept of adaptive systems.** F. E. Gomer (McDonnell Douglas Astronautics Co., Engineering Psychology Dept., St. Louis, MO). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 271-287. 35 refs. Contract No. MDA903-78-C-0181.

Current trends in the development of manned systems for aerospace applications are reviewed particularly as they relate to provisions for the use of the adaptive capabilities of computer-based systems based on the results of physiological monitoring. The replacement of dedicated, single-purpose instruments and controls with multipurpose displays and keyboards brought about by increasing task demand and space limitations is discussed for the example of the instrument panel of a fighter-bomber aircraft, and it is noted that despite these improvements, there is concern that pilot mental workload problems will remain significant. Possible adaptive procedures that may be implemented to alleviate the workload are indicated, and the various physiological methods that may be used to detect momentary changes in mental function are examined, including electroencephalographic event-related potentials and contingent negative variation, and eye movement measurements. The current status of electrophysiological measurements during flight simulations is indicated. A.L.W.

**A82-36964 Electrophysiological measurement techniques.** G. Rau (Helmholtz Institute for Biomedical Engineering, Aachen, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 289-304. 12 refs.

Technical aspects of the utilization of electrophysiological techniques are discussed. The frequency range and amplitude distribution of the signals commonly detected by surface electrodes are summarized, and problems in measurement accuracy associated with the complex resistance of the skin, the electrode and the electrode-electrolyte transition, and the cable connecting the electrodes to the amplifier are examined. Factors in amplifier design which may then be used to reduce these difficulties are considered, and improvements to the signal to noise ratio represented by the techniques of optical coupling, digital filtering and artifact detection and suppression are indicated. Results of the application of these improvements are presented for the case of a technique for the measurement of visual evoked potentials, and a microcomputer system which may be used for the acquisition and processing of electrophysiological signals in a laboratory environment is described. A.L.W.

**A82-36965 Electromyography and applications.** K.-P. Gärtner (Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Anthropotechnik, Wachtberg-Werthhoven, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980 New York, Plenum Press, 1981, p. 305-321. 20 refs.

Electromyography is discussed as a reliable objective method for the measurement of muscular activity and its relation with factors that influence work performance. The physiological basis of electromyography, which shows the summed activity of single muscle fibers, single motor units or several motor units, is explained, and techniques for the use of surface electromyography, which is preferred in ergonomics due to its noninvasive character, are presented. Techniques for the analysis of electromyographic signals are then examined, with attention given to rectifying, integrating and averaging by digital or analog methods and frequency analysis. Finally, applications of electromyography in man-machine systems as an indicator of muscular strain, as biofeedback and as a tool in ergonomic evaluations are discussed. A.L.W.

**A82-36966 Analysis of human movements for workplace design.** K.-P. Holzhausen (Forschungsgesellschaft für angewandte Naturwissenschaften, Forschungsinstitut für Anthropotechnik, Wachtberg-Werthhoven, West Germany). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 337-362. 37 refs.

Experimental design, tools, and analytical techniques for establishing an anthropometric data base for movement and distance parameters for human functions in the workplace are reviewed. Specific attention is given to the range of human actions in a seated position, a position relevant to control consoles and cockpits, with data being accumulated on human stature, reach, and range of motions, as well as on the patterns of movement. Technical approaches to cataloging the motions are examined, including mechanical, photographic, optoelectronic, and fully electronic monitoring and recording. Stereophotographic methods allow the investigation of movements with three-dimensional trajectories by use of two cameras. Attention is given to static models such as BOEMAN, linkman, COMBIMAN, and the Crewstation Geometry Evaluator systems for computer aided design of cockpit interiors. Applications of the techniques to solving workplace inefficiencies are illustrated with examples. M.S.K.

**A82-36967 * Evaluation of synthesized voice approach callouts /SYNCALL/.** C. A. Simpson (Psycho-Linguistic Research Associates, Menlo Park, CA). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 375-393. 42 refs. Research supported by the National Research Council; Grants No. NGL-05-046-002; No. NGR-45-003-108.

The two basic approaches to the generation of 'synthesized' speech include a utilization of analog recorded human speech and a construction of speech entirely from algorithms applied to constants describing speech sounds. Given the availability of synthesized speech displays for man-machine systems, research is needed to study suggested applications for speech and design principles for speech displays. The present investigation is concerned with a study for which new performance measures were developed. A number of air carrier approach and landing accidents during low or impaired visibility have been associated with the absence of approach callouts. The study had the purpose to compare a pilot-not-flying (PNF) approach callout system to a system composed of PNF callouts augmented by an automatic synthesized voice callout system (SYNCALL). Pilots were found to favor the use of a SYNCALL system containing certain modifications. G.R.

**A82-36968 Evaluating simulator validity.** J. Moraal (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Instituut voor Zintuigfysiologie TNO, Soesterberg, Netherlands). In: Manned systems design: Methods, equipment, and applications; Proceedings of the Conference, Freiburg im Breisgau, West Germany, September 22-25, 1980. New York, Plenum Press, 1981, p. 411-426. 13 refs.

Problems associated with the use of simulator validation criteria are discussed with reference to three studies concerning a ship navigator simulator, a driving simulator for research purposes, and a tank driver training simulator. It is emphasized that the functional correspondence or validity should be defined in relation to the purpose of the simulator. Thus, a training simulator is valid as long as transfer-of-training to the real system is achieved, while a research simulator is valid when experimental results of the simulator and the real system are congruent, so that performance predictions can be made from one to the other. It is also pointed out that the functional correspondence can be improved by increasing the physical correspondence. V.L.

**A82-36971 † Motion sickness, its prevention and treatment (Ukachivanie, ego profilaktika i lechenie).** M. P. Efremenko. Moscow, Izdatel'stvo DOSAAF SSSR, 1981. 72 p. In Russian.

The causes and symptoms of motion sickness are discussed on the basis of a survey of the literature. Methods of preventing and treating the malaise are suggested. The various forms of motion sickness are delineated, and a chart containing 20 symptoms is included. It is shown that training programs can lower the incidence of motion sickness among sailors and aircrew members. C.R.

**A82-36976 † Hormonal mechanisms of adaptation and training (Gormonal'nye mekhanizmy adaptatsii i trenirovki).** A. A. Viru. Leningrad, Izdatel'stvo Nauka, 1981. 156 p. 639 refs. In Russian.

The role of hormones in the adaptation response in general and in the mechanism of general adaptation and the transfer of short-term adaptations to the long term in particular is discussed with particular emphasis on the glucocorticoid hormones. The historical development of the concept of general, nonspecific adaptation starting from the work of Selye (1936), which showed the importance of the hypophyseal-adrenocortical system, is reviewed, and the adaptive functions of this system are examined in detail, with attention given to the control of the stress reaction and the mechanism of action of the glucocorticoids. Interactions of various systems, including the endocrine systems and the central nervous system, in the mechanism of the general adaptation syndrome are also considered. Finally, the problem of the development of long-term adaptation is examined for the model of physical training. A.L.W.

**A82-37182 Training maintenance technicians for troubleshooting - Two experiments with computer simulations.** W. B. Johnson and W. B. Rouse (Illinois, University, Urbana, IL). *Human Factors*, vol. 24, June 1982, p. 271-276. 13 refs. Contract No. MDA903-79-C-0421.

Aviation maintenance trainees participated in two experiments designed to assess the relative effectiveness of traditional instruction versus two types of computer simulation in the context of aircraft power-plant troubleshooting. Simulations ranged in nature from abstract, context-free problems to those involving specific aircraft power plants. Traditional instruction included reading assignments, television programs tailored to aircraft power-plant troubleshooting, and on-line quizzes. The first experiment compared the three training methods, and the second considered a mixture of the two computer simulations versus traditional instruction. The primary conclusion was that an appropriate combination of low- and moderate-fidelity computer simulations can provide sufficient problem-solving experience to be competitive with the more traditional lecture/demonstration form of instruction. (Author)

**A82-37183 Screening designs used to estimate the relative effects of display factors on dial reading.** H. O. Whitehurst (California State University, Northridge, CA). *Human Factors*, vol. 24, June 1982, p. 301-310. 6 refs.

Two experiments were conducted to determine if screening designs could be used to obtain reliable estimates of the relative strength of effect of several independent variables. Specifically, the effects of eight independent variables on the speed and accuracy of reading moving-pointer, fixed-scale dials were tested. Additional objectives were to determine if the black-white relationship of the scale markers and dial background affects dial-reading performance or subject preferences. The percentage of the variance accounted for by each main effect was very similar across screening designs. The progression of the numbers on the scale had by far the strongest effect. Interpolation and scale unit length also had relatively strong effects, while scale orientation, marker width, pointer design, clutter, and scale number location had weak to trivial effects. Black-on-white and white-on-black dials were read at about the same speed, but more errors were made while subjects read the black-on-white, even though they preferred the black-on-white dials. (Author)

**A82-37184 Locus of the stimulus to visual accommodation - Where in the world, or where in the eye.** J. C. Hull, S. N. Roscoe (New Mexico State University, Las Cruces, NM), and R. T. Gill (Wright State University, Dayton, OH). *Human Factors*, vol. 24, June 1982, p. 311-319. 15 refs. Contract No. F49620-77-C-0117; Grant No. AF-AFOSR-80-0024.

Eight observers judged the apparent size of a 'moon' simulated by projecting a collimated disk of light just above the horizon in real scenes and virtual images. In each of three viewing conditions, Back-lighted Screen (collimated), Back-projected Photograph (collimated), and Natural Campus Scene, masks inserted in the viewing aperture of the 'moon machine' obscured various horizontal bands of the lower half of the visual field. With each experimental manipulation, both the perceived size of the moon and the observer's visual accommodation distance (measured with a laser optometer) covaried systematically. From the combined results of two experiments, it appears that (1) viewing a collimated image of a natural vista does not have the same effects as viewing the actual scene, (2) the retinal locus of visible texture is the primary determinant of perceived size of objects of constant visual angle embedded in natural scenes, and it has a strong effect on accommodation to virtual images, and (3) the overall correlation between apparent, or perceived, size and accommodation shift from the individual's dark focus, averaged across observers, approaches unity. (Author)

**A82-37185 Using realistic sensor, target, and scene characteristics to develop a target acquisition model.** B. L. Sibernagel (Allen Corporation of America, Orlando, FL). *Human Factors*, vol. 24, June 1982, p. 321-328.

This paper provides a model of target acquisition that will aid in the design of electro-optical detection devices. Twelve subjects, highly skilled in target detection, located targets in 32 terrain scenes taken from a realistic terrain board. Independent variables included display resolution, field of view, target contrast, target range, number of targets, and scene complexity. All experimental variables had a significant effect on target detection performance. A regression equation is presented, which can be used to predict detection time given the various sensor, target, and scene characteristics. (Author)

**A82-37186 Perceptual discriminability as a basis for selecting graphic symbols.** R. E. Geiselman (California, University, Los Angeles, CA), B. M. Landee, and F. G. Christen (Perceptronics, Inc., Woodland Hills, CA). *Human Factors*, vol. 24, June 1982, p. 329-337. 6 refs. Army-supported research.

The purpose of this research was to develop a performance-based criterion for selecting among alternative symbols to be used in graphic displays. The specific criterion developed was an index of perceptual discriminability. Through regression analyses of an intersymbol similarity-rating matrix, it was concluded that symbols are judged more or less similar on the basis of the number of shared versus unique configural attributes (an X, a triangle, etc.), as opposed to primitive attributes (number of lines, arcs, etc.). An easy-to-use discriminability-index formula was derived from the regression analysis involving the configural attributes, and this formula was used to predict the results of an experiment involving a search for specific symbols embedded in an array. Indices obtained from a formula such as the one developed here could be used as part of the basis for choosing among alternative candidate symbols for inclusion in an existing symbol domain. (Author)

**A82-37187 Noise and annoyance - A new methodology.** G. M. Corso and M. E. Moomaw (Georgia Institute of Technology, Atlanta, GA). *Human Factors*, vol. 24, June 1982, p. 339-345. 5 refs.

The effects of noise intensity on annoyance are investigated in two experiments involving the use of a visual signal to designate the impending occurrence of a 1000 Hz pure tone. The noise was timed to occur only if response time was greater than 250 msec, and to terminate with the response. The first experiment's results indicate that the no-noise condition and 50 dBA values differed significantly from the 90 dBA value in terms both of number of avoidance responses and response latencies, implying that avoidance and latency are indicators of annoyance. The second experiment investigated range effects on the number of avoidance responses and their latencies. Significant differences are noted between a group exposed to 50, 60 and 70 dBA and another exposed to 70, 80 and 90 dBA, suggesting that avoidances and latencies are a function of both absolute intensity value and the range of intensities used. Attention is given to the advantages and disadvantages of the avoidance procedure. O.C.

**A82-37372** † **The effect of space flight factors on quiescent nuclei of certain plant and animal test objects (Vliianie faktorov kosmicheskogo poleta na pokoiashchiesia iadra nekotorykh rastitel'nykh i zhivotnykh model'nykh ob'ektov).** N. L. Delone, V. V. Antipov, and B. I. Davydov. *Kosmicheskie Issledovaniia*, vol. 20, May-June 1982, p. 489-492. 10 refs. In Russian.

The phenomenon of quiescent or silent cell nuclei was examined in tests performed on plant and animal test objects on a variety of spacecraft (Vostok-3, Soyuz-4, Cosmos-690, Cosmos-110, etc.). the effect of space flight factors on: (1) the 'reanimation' of seeds of higher plants that had lost their germinating ability; (2) the liver cells of turtles (Testudo horsfieldi Gray); and (3) the generative nuclei of the binuclear pollen Tradescantia paludosa were examined. The phenomenon of quiescent or silent cell nuclei, where no reading of genetic information occurs, was observed in all three types of organisms under space flight conditions. It is suggested that this silent state is associated with a loss of feedback between the nucleus and the cytoplasm. B.J.

**A82-37420** * **Beta decay and the origins of biological chirality - Experimental results.** D. W. Gidley, A. Rich, J. Van House (Michigan, University, Ann Arbor, MI), and P. W. Zitzewitz (Michigan, University, Dearborn, MI). *Nature*, vol. 297, June 24, 1982, p. 639-643. 25 refs. NSF-NASA-supported research.

Preliminary experimental results are presented of an investigation of the possible role of preferential radiolysis by electrons emitted in the beta decay of radionuclides, a parity-nonconserving process, in the universal causation of the optical activity of biological compounds. Experiments were designed to measure the asymmetry in the production of triplet positronium upon the bombardment of an amino acid powder target by a collimated beam of positrons as positron helicity or target chirality is reversed. No asymmetry down to a level of 0.0007 is found in experiments on the D and L forms of cystine and tryptophan, indicating an asymmetry in positronium formation cross section of less than 0.01, while an asymmetry of 0.0031 is found for leucine, corresponding to a formation cross section asymmetry of about 0.04. A.L.W.

**A82-37421** **Beta decay and the origins of biological chirality - Theoretical results.** R. A. Hegstrom (Wake Forest University, Winston-Salem, NC). *Nature*, vol. 297, June 24, 1982, p. 643-647. 13 refs.

A dynamical mechanism is found whereby a dissymmetric molecule and its mirror image are ionized at different rates by longitudinally polarized electrons such as produced by nuclear beta decay. An enhancement is predicted for molecules containing heavy atoms. Order-of-magnitude estimates indicate that the asymmetric effect of this mechanism may be detectable by current experiments on positronium formation. (Author)

**A82-37423** * **Methane flux in the Great Dismal Swamp.** R. C. Harriss, D. I. Sebacher (NASA, Langley Research Center, Hampton, VA), and F. P. Day, Jr. (Old Dominion University, Norfolk, VA). *Nature*, vol. 297, June 24, 1982, p. 673, 674. 33 refs. NASA-supported research; NSF Grant No. DEB-77-08609.

The paper reports measurements made over a 17-month period of the methane flux in the Great Dismal Swamp of Virginia in light of the potential implications of variations in atmospheric methane concentrations. Gas flux measurements were made by a technique combining a gas filter correlation IR absorption analyzer with improved sampling chambers that enclose a soil area under conditions ranging from totally flooded soils to dry soils resulting from drought conditions. Methane emissions are found to range from 0.0013 g CH4/sq m per day to 0.019 g CH4/sq m per day, depending on temperature and season, when the soil is in a waterlogged state. During drought conditions, the peat soils in the swamp were a sink for atmospheric methane, with fluxes from less than 0.001 to 0.005 g CH4/sq m per day and decreasing with decreasing temperature. Results illustrate the potential complexity of the processes which regulate the net flux of methane between wetland soils and the atmosphere. A.L.W.

**A82-37926** **Fibrinopeptide A after strenuous physical exercise at high altitude.** P. Bärtsch, E. K. Schmidt, and P. W. Straub (Bern, Universität, Berne, Switzerland). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, July 1982, p. 40-43. 33 refs.

Alterations in blood coagulation following exhaustive exercise at high altitude are studied in view of the possible role of thrombosis in the pathology of acute mountain sickness. Subjects resident at an altitude of 600 m were transported by railroad to an altitude of 3457 m, where half of them underwent bicycle ergometer exercise to exhaustion while the other half served as controls. Pre-exercise blood samples taken 1 hour after arrival at altitude showed no significant alterations in coagulation parameters as compared with samples taken at 600 m. Both immediately after and 1 hour after exercise, the clotting times and euglobin lysis times were shortened and factor VII activity was elevated in the exercise group but not the controls, although there was no significant difference in fibrinopeptide A levels and the ethanol gelation test remained negative. No rise in fibrin(ogen) degradation products or fibrin(ogen) fragment E was found. It is therefore concluded that strenuous exercise at altitude does not lead to a rise in thrombin-mediated fibrin formation in young healthy males. A.L.W.

**A82-37927** **Comparison of human vocal cord movements during isocapnic hypoxia and hypercapnia.** S. J. England, D. Bartlett, Jr., and S. L. Knuth (Dartmouth College, Hanover, NH). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, July 1982, p. 81-86. 25 refs. Grant No. NIH-HL-19827.

Respiratory vocal cord movements were analyzed in healthy human subjects during air breathing and in isocapnic hypoxia and hypercapnia. In the majority of experiments, expiratory glottic narrowing was substantially greater during hypoxia than during hypercapnia. Because ventilations were carefully matched under these two conditions, it is concluded that hypoxic stimulation of peripheral chemoreceptors favors expiratory glottic narrowing and leads to a relatively high laryngeal airflow resistance. In contrast, hypercapnia is accompanied by low expiratory laryngeal resistance. Similar rates of expiratory airflow with these two stimuli must be achieved by different balances of the factors that determine this flow. (Author)

**A82-37928** **Brain hypoxia and control of breathing - Role of the vagi.** R. W. Chapman, T. V. Santiago, and N. H. Edelman (Rutgers University, Piscataway, NJ). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, July 1982, p. 212-217. 27 refs. Grants No. NIH-HL-16022; No. NIH-HL-07647.

The role of vagally mediated reflexes in the ventilatory response to progressive brain hypoxia secondary to carboxyhemoglobinemia is investigated. Measurements of ventilatory parameters were made at different levels of carboxyhemoglobinemia before and after vagotomy in unanaesthetized goats. Vagotomy is found to change the breathing pattern to a slower, deeper pattern, while increasing resting heart rate and arterial pressure under normoxia. Carboxyhemoglobin levels greater than 45% initiate a large increase in respiratory rate and a lesser increase in inspiratory minute volume, the magnitudes of which are reduced somewhat after vagotomy. Whereas carboxyhemoglobinemia had a biphasic effect on the lung inflation reflex prior to vagotomy, increasing the ratio of the inspiratory duration of a fully occluded breath to that of a spontaneous breath at low carboxyhemoglobin levels and reducing the ratio to unity at high levels, vagotomy led to the constancy of the ratio at unity for all levels of carboxyhemoglobin, indicating the abolition of the lung inflation reflex. Results indicate that contributions from vagally mediated mechanisms to the overall ventilatory response to brain hypoxia are small in magnitude. A.L.W.

**A82-37929** **Muscle weakness following dynamic exercise in humans.** C. T. M. Davies and M. J. White (Queen's Medical Centre, Nottingham, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, July 1982, p. 236-241. 19 refs.

The effects of dynamic exercise on muscular force generation in response to electrical stimulation are investigated in subjects performing 1 hour of level running and uphill walking at a gradient of 25% on a treadmill, and box stepping on and off a 0.5-m platform. Tension development was measured during both submaximal and supramaximal twitch and tetanic stimulation of the triceps surae before and after exercise. At submaximal stimulation voltages, running and walking are found to enhance twitch and tetanic responses, however the supramaximal time to peak tension, twitch tension and tetanic tensions were reduced, with the reduction in tetanus at 100 Hz associated with a decrease in maximal voluntary contraction. Muscular functions were found to return to normal 2 hours after running and walking, in contrast to box-stepping, which produced a more pronounced weakening which lasted at least 22 hours. Results illustrate the difficulties in using submaximal stimulation voltages and tetanic response ratios in studies of muscle function, and suggest that long-lasting muscle weakness is not associated with recovery from prolonged running or walking. A.L.W.

**A82-37930** **Brain extracellular fluid pH and blood flow during isocapnic and hypocapnic hypoxia.** W. F. Nolan and D. G. Davies (Texas Tech University, Lubbock, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, July 1982, p. 247-252. 35 refs. Research supported by the Tarbox Research Institute; Grant No. NIH-HL-25984.

The role of brain extracellular fluid pH in the regulation of the cerebrovascular response to hypoxia is studied by means of simultaneous measurements of extracellular fluid pH and blood flow during isocapnic and hypocapnic hypoxia. Measurements of diencephalon and total brain blood flows were made by the radioactive microsphere technique concurrently with microelectrode determinations of extracellular fluid pH in the diencephalon in anaesthetized, paralyzed rabbits artificially ventilated with gas mixtures containing 11-12% O2 or 3.3%

$CO_2$ and 9-10% $O_2$. Diencephalon and total brain blood flow rates are observed to increase and vascular resistances to decrease after 4-6 minutes of isocapnic hypoxia, while extracellular fluid pH increased after the first minute and remained elevated for 20 min. During hypocapnia, blood flow and vascular resistance remained constant as extracellular pH was elevated, while hypocapnic hypoxia led to a decrease in vascular resistance with no change in blood flow rate. Results indicate that some factor other than H(+) concentration must mediate early hypoxic vasodilation. A.L.W.

**A82-37968** **Operator indoctrination during introduction of new or modified aviation life support systems /ALSS/.** D. W. Call (U.S. Navy, Pacific Missile Test Center, Point Mugu, CA). *SAFE Journal*, vol. 12, Summer 1982, p. 6-9. 8 refs. Air Task A53153/054-4/2531100.

Methods of effective operator indoctrination on the proper use of new or modified items of ALSS are presented. Carefully prepared and used operator indoctrination packages in various formats (slides with narratives, video tapes, demonstrators, etc.) can be a significant factor in helping aircrewmen understand why ALSS are being introduced as well as how to use them, thus increasing the chances for proper use during an emergency. The operator indoctrination package for the 'Personal Parachute Four-Line Release System', developed by the Pacific Missile Test Center, is used as a model to show the application of this training concept. N.B.

# STAR ENTRIES

**N82-26951#** Turku Univ. (Finland).
**SPIN IMAGING EQUIPMENT FOR SMALL ANIMAL EXPERIMENTS Physical Lab.**
P. H. Oksman, M. E. S. Komu, E. K. Koivula, M. Punkkinen, and Vaeinoe Hovi, ed. 1981 14 p refs
(ISBN-951-41-0420-X; ISSN-0066-2003) Avail: NTIS
HC A02/MF A01

A spin imaging equipment to study small animals is described. The homogenization of the magnetic field and to the field gradient coils and currents are examined. The currents and also a substantial part of the image formation, based on the sensitive point method, are controlled by a microprocessor. Cross-sectional pictures of an olive and a rat are shown. E.A.K.

**N82-26952*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO. 3 Quarterly Review**
Courtland S. Lewis Sep. 1981 55 p refs
(Contract NASw-3223)
(NASA-CR-168582; NAS 1.26:168582) Avail: NTIS
HC A04/MF A01 CSCL 05A

Soviet scientists are making significant contributions to the field of space medicine and biology through their active manned space program, frequent biosatellites, and extensive ground-based research. An overview of the developments and direction of the USSR Space Life Sciences Program is provided. L.F.M.

**N82-26953*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO. 4 Quarterly Review**
Courtland S. Lewis and Kristy Donnelly Dec. 1981 59 p refs
(Contract NASw-3469)
(NASA-CR-168691; NAS 1.26:168691) Avail: NTIS
HC A04/MF A01 CSCL 05A

Soviet scientists are making significant contributions to the field of space medicine and biology through their active manned space program, frequent biosatellites, and extensive ground-based research. An overview of the developments and direction of the USSR Space Life Sciences Program is provided. L.F.M.

**N82-26954*#** Kentucky State Univ., Frankfort. Dept. of Biology.
**ZOOLOGICAL EFFECTS OF VARIATIONS IN ATMOSPHERIC OXYGEN LEVELS Final Technical Report**
Gerrit Kloek Jun. 1982 25 p refs
(Grant NAG10-00801)
(NASA-CR-169020; NAS 1.26:169020) Avail: NTIS
HC A02/MF A01 CSCL 06B

The role of certain gene enzymes in survival in modified atmospheres was examined. Chromosome morphology was studied. Mortality and life span were measured. Equipment to deliver various gas mixtures to the flies was designed and fabricated. To study the gene enzymes a technique called starch gel electrophoresis was needed. Equipment and supplies for this work and the study of chromosome morphology was available on the market, although some of the equipment was fabricated to save the project money. Author

**N82-26955*#** California Inst. of Tech., Pasadena. Seismological Lab.
**IMPACT OF AN ASTEROID OR COMET IN THE OCEAN AND EXTINCTION OF TERRESTRIAL LIFE**
Thomas J. Ahrens and John D. OKeefe 1982 21 p refs
(Grant NsG-7129)
(NASA-CR-169086; NAS 1.26:169086) Avail: NTIS
HC A02/MF A01 CSCL 06C

Finite difference calculations describing the impact mechanics associated with a 10 to 30 km diameter silicate or water object impacting a 5 km deep ocean overlying a silicate solid planet demonstrate that from 12 to 15% of the bolide energy resides in the water. It is speculated that minimal global tsunami run-up heights on the continents would be 300-400 meters, and that such waves would inundate all low altitude continental areas, and strip and silt-over virtually all vegetation. As a result the terrestrial animal food chain would be seriously perturbed. This could in turn cause extinction of large terrestrial animals. L.F.M.

**N82-26956#** Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Chemical Systems Lab.
**THE SUBCHRONIC INHALATION TOXICITY OF POLYETHYLENE GLYCOL 200 IN THE RAT AND MOUSE Technical Report, Oct. 1979 - Oct. 1980**
J. W. Crook, P. D. Hott, A. E. Cooper, E. G. Cummings, S. A Thomson, R. L. Farrand, C. Lilly, D. H. Heitkamp, and J. T. Weimer Dec. 1981 24 p refs
(DA Proj. 1L1-62622-A-554-4E)
(AD-A110668; ARCSL-TR-81051) Avail: NTIS
HC A02/MF A01 CSCL 06/20

In this study mice and rats were repeatedly exposed to concentrations of either 100 mg/cu. m or 1000 mg/cu. m of PEG 200 aerosol for 6 hours a day, 5 days a week, for up to 13 weeks. The mice and rats did not appear to have any lesions related to the experimental procedure. No biologically consistent significant alterations in blood chemistry, hematology, or pulmonary resistance were found. No mutations or pathological abnormalities could be attributed to exposure to PEG 200. The data resulting from these studies may be useful in the derivation of airborne control limits for protection of personnel. Author (GRA)

**N82-26957#** Army Research Inst. of Environmental Medicine, Natick, Mass. Experimental Pathology Div.
**FREEZE-THAW INDUCED DAMAGE TO ENDOTHELIAL CELLS IN VITRO. 1. DEVELOPMENT OF A SUITABLE SYSTEM**
Lynn R. Trusal, Carol J. Baker, and Albert W. Guzman 25 Mar. 1981 26 p refs
(DA Proj. 3E1-61102-BS-10)
(AD-A111074; USARIEM-M-5/81) Avail: NTIS
HC A03/MF A01 CSCL 06/5

The study of freeze-thaw damage to endothelial cells necessitated the development of a suitable in vitro system. After investigating various substrates, Leighton tubes containing a plastic coverslip proved to be the most versatile method for studying alterations to endothelial cells following thaw. The polymethylpentene coverslip was the key to its versatility. It was easily cut which allowed portions of the same monolayer to be processed for examination by phase contrast, brightfield, and both scanning and transmission electron microscopy. At the same time, the attached handle allowed easy manipulation without disturbing the monolayer. Also, following a freeze-thaw insult, endothelial cells remained better attached to the plastic substrate than to glass coverslips. The Leighton tube itself was ideal for temperature studies because it was water tight which allowed submersion in refrigerated water baths. The media covering the cells can be assayed for cellular enzymes released into the media. In this manner, biochemical markers from the same cells may be correlated with cellular structure. Author (GRA)

**N82-26958#** Army Research Inst. of Environmental Medicine, Natick, Mass.
**ACUTE HEAT/EXERCISE STRESS IN RATS: EFFECTS ON FLUID AND ELECTROLYTE REGULATORY HORMONES**
Ralph Francesconi and Milton Mager 20 Jan. 1982 22 p refs
(DA Proj. 3E1-61102-BS-10)
(AD-A110559; USARIEM-M-12/82) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Adult, male rats were exercised (level treadmill, 9.14 m/min) in the heat (35 C, 30-35% rh) until hyperthermic exhaustion (T sub re = 42.5 - 43 C) ensued. Blood samples (0.3 ml) were taken immediately prior to exercise in the heat (time 0), when T sub re reached 40 C (8.25 min treadmill time), when hyperthermic exhaustion occurred, and again when T sub re decreased to 40 C. Plasma was separated and assayed for aldosterone, angiotensin I (plasma renin activity), and antidiuretic hormone (arginine-vasopressin). Plasma aldosterone levels were significantly ($p < .001$) elevated after 8 min of exercise and remained increased throughout the exercise and recovery periods. Alternatively, plasma angiotensin I levels were unaffected during exercise, but increased significantly ($p < .001$) during the recovery period. Arginine-vasopressin concentrations were likewise significantly ($p<.05$) elevated by completion of the exhaustive run and continued to increase during the recovery period. We attributed these elevations in levels of the fluid and electrolyte regulatory hormones to part of an adaptational response to maintain or increase plasma volume during exercise in the heat. Significant ($p<.001$) decrements in hematocrit ratio occurred during the exercise interval. However, we were unable to relate the ultimate ability of the animal to survive the heat/exercise-induced injury to the intensity of its hormonal response pattern to exercise in the heat. GRA

**N82-26959#** Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
**LOCAL SERIAL CORRELATION IN BEHAVIORAL STATES IN THE MOUSE**
Gary S. Richardson, Peter A. W. Lewis, Endel J. Orav, and William C. Dement Sep. 1981 21 p refs Prepared in cooperation with Stanford Univ., Calif.
(Grant NIH-MH-27913; NR Proj. 042-284)
(AD-A111021; NPS55-81-022) Avail: NTIS HC A02/MF A01 CSCL 05/1

In the mouse, Mus musculus, local (ultradian) serial correlation (LSC) within the sleep and wakefulness states varies significantly as a function of circadian phase. The amplitude of the correlation function is greatest during the active phase of the mouse's diurnal cycle. Additionally, mean LSC (averaged across circadian phase) is significantly positive and monotonically decreasing for a broad range of short lags (1-23 minutes). Thus there is no evidence of positive, periodically occurring peaks in the correlation function separated by patches of small or negative correlations that is characteristic of a rhythmic process of fixed period. These findings challenge the concept that an ultradian oscillator plays a significant role in the temporal control of sleep-wake state. Author (GRA)

**N82-26960*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**ABSORBENT PRODUCT AND ARTICLES MADE THEREFROM Patent Application**
James V. Correals and Frederic S. Dawn, inventors (to NASA) Filed 14 Apr. 1982 14 p
(NASA-Case-MSC-18223-2; US-Patent-Appl-SN-368187) Avail: NTIS HC A02/MF A01 CSCL 06B

An invention comprising a multi-layered absorbent article suitable for collecting body waste products is described. Author

**N82-26961*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**APPARATUS FOR DISINTEGRATING KIDNEY STONES Patent Application**
Donald S. Friedman, inventor (to NASA) Filed 13 May 1982 13 p
(NASA-Case-GSC-12652-1; US-Patent-Appl-SN-377891) Avail: NTIS HC A02/MF A01 CSCL 06B

A mechanical system for disintegrating urinary calculi, particularly an ultrasonic apparatus for fragmenting urinary calculi in situ is described. The useful life of the wire probe in an ultrasonic kidney stone disintegration instrument is enhanced and prolonged by attaching the wire of the wire probe to the tip of an ultrasonic transducer by means of a clamping arrangement. Additionally, damping material is applied to the wire probe in the form of a damper tube through which the wire probe passes in the region adjacent the transducer tip. Novelty is believed to reside in the combination of a grooved adjustable anvil in the transducer tip at the clamping point of the wire probe to lessen concentrated stresses in the wire and a vibrational damper system which minimizes lateral wire motion at the transducer tip while nevertheless transmitting linear motion which acts to prolong the useful life of the wire probe. NASA

**N82-26962*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**PROSTHETIC OCCLUSIVE DEVICE FOR AN INTERNAL PASSAGEWAY Patent Application**
John B. Tenney, Jr., inventor (to NASA) (Rochester General Hospital, N.Y.) Filed 23 Apr. 1982 15 p Sponsored by NASA
(NASA-Case-MFS-25640-1; US-Patent-Appl-SN-371352) Avail: NTIS HC A02/MF A01 CSCL 06B

A prosthetic device for occluding an internal passageway of the human body, for example, for closing the urinary canal, is described. The device includes a cuff having a backing collar and two isolated cuff chambers. The fluid pressure of one chamber is regulated by a pump/value reservoir unit. The other chamber is unregulated in pressure but its fluid volume is adjusted by removing or adding fluid to a septum/reservoir by means of a hypodermic needle. Pressure changes are transmitted between the two cuff chambers via faying surfaces which are sufficiently large in contact area and thin as to transmit pressure generally without attenuation. By adjusting the fluid volume of the septum, the operating pressure of the device may be adjusted to accommodate tubular organs of different diameter sizes as well as to compensate for changes in the organ following implant without re-operation. NASA

**N82-26963#** Indiana Univ., Bloomington. School of Medicine.
**SLEEP DEPRIVATION AND EXERCISE TOLERANCE Annual Summary Report, 2 Jan. 1981 - 31 Jan. 1982**
Bruce J. Martin Jan. 1982 9 p refs
(Contract DAMD17-81-C-1023; DA Proj. 3E1-62777-A-879)
(AD-A113043; ASR-1) Avail: NTIS HC A02/MF A01 CSCL 06/19

The effects of sleep deprivation on the ability of humans to tolerate standard forms of endurance exercise were investigated. Standard techniques in human exercise physiology were utilized. The results indicate that acute sleep loss of 30 to 36 hours (1) does not alter the maximal oxygen uptake, while it does reduce maximal heart rate; (2) leaves metabolic rate during exercise at a constant external work load unchanged, while heart rate is reduced and ratings of perceived exertion are elevated; (3) reduces tolerance of prolonged heavy exercise at three-fourths of the maximal oxygen uptake by about 10%, with wide variation noted among individuals, and (4) to significantly change work loads selected for equal effort during short term heavy exercise. It is concluded that acute sleep loss of 30 to 36 hours has relatively minor deleterious effects on endurance exercise performance. Author

**N82-26964*#** Florida Univ., Gainesville. Dept. of Pathology.
**THE CLINICAL PRACTICE LIBRARY OF MEDICINE (CPLM): AN ON-LINE BIOMEDICAL COMPUTER LIBRARY. SYSTEM DOCUMENTATION Final Report**
Ralph R. Grams 6 Jun. 1982 131 p refs
(Grant NAG10-0004)
(NASA-CR-169018; NAS 1.26:169018) Avail: NTIS HC A07/MF A01 CSCL 06E

A system designed to access a large range of available medical textbook information in an online interactive fashion is described. A high level query type database manager, INQUIRE, is used. Operating instructions, system flow diagrams, database descriptions, text generation, and error messages are discussed. User information is provided. N.W.

**N82-26965#** Illinois Univ., Urbana. Engineering Psychology Research Lab.
**THE PRODUCTION OF SPECIFIED ELECTROCORTICAL ACTIVITY AS A MEASURABLE TASK**
Dennis B. Beringer and Michael G. H. Coles Feb. 1981 66 p refs
(Contract DACA88-80-C-0003; DA Proj. 4A1-61102-AT-23; AF Proj. 2313)
(AD-A111422; EPL-81-2/USACERL-81-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

Global electrocortial activity (alpha) was examined as a possible index of subtle environmental effects upon productivity in cognitive tasks. A new model of biofeedback was proposed to account for the various effects described in the literature. Although consistent with previous findings, the model received no additional confirmation from the current study. It was concluded that the measure was overly sensitive and unstable. Other multivariate measurement schemes were suggested. Author (GRA)

**N82-26966#** Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
**TOXICOLOGY OF HIGH ENERGY FUELS**
Michael G. MacNaughton Dec. 1981 16 p refs
(AF Proj. 6302)
(AD-A111686; AFAMRL-TR-81-136) Avail: NTIS HC A02/MF A01 CSCL 06/2

The development of new weapons systems, high energy fuels, and aerospace materials presents a challenge to the health professional. To avoid health hazards to Air Force personnel these hazards must be identified early in the research phase of development before acquisition decisions are made. This is only possible if the health professional works closely with the design engineers and scientists. The Air Force program to develop high energy cruise missile fuels is a good example of close cooperation between scientists developing these fuels and toxicologists and environmental engineers responsible for research to assess the health and environmental consequences of their deployment throughout the Air Force. A status report is given on the extensive toxicology data base research effort on these fuels. Included are data on acute, chronic and oncogenic exposures; mutagenic screening tests and emergency exposure limits. Author (GRA)

**N82-26967#** Army Research Inst. of Environmental Medicine, Natick, Mass. Altitude Research Div.

### DIFFERENTIATED RATINGS OF PERCEIVED EXERTION ARE INFLUENCED BY HIGH ALTITUDE EXPOSURE

Andrew J. Young, Allen Cymerman, and Kent B. Pandolf 23 Mar. 1981 25 p refs
(AD-A111075; USARIEM-M-1/81) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Differentiated ratings of perceived exertion (RPE) were obtained from 8 low-altitude residents during cycle exercise at sea level (SL) and after acute (< 2 hours) and chronic (18 days) exposure to high altitude (4,300m; HA). Mean VO2 max was 27% lower than at SL with acute HA exposure and was not significantly changed with chronic exposure. Subjects cycled for 30 min at an exercise intensity requiring 85% of VO2 max. Respiratory exchange measurements and differentiated RPE were obtained at the fifth, fifteenth, and twenty-fifth min of exercise and pre- and post-exercise blood samples were collected. Differentiated RPE included a local muscular rating, a central or cardiopulmonary rating, and an overall rating. Despite reduced absolute exercise intensity during acute HA exercise, local RPE were unchanged from SL values. Chronic HA exercise, however, was associated with a significant reduction in local RPE. Blood lactate accumulation during SL exercise was not significantly different from acute HA exercise but was significantly less during chronic HA exercise. At SL, local ratings were significantly greater than central ratings while neither differed significantly from the overall ratings. During acute and chronic HA exercise, none of the differentiated ratings significantly differed, and central RPE were highest of the ratings during chronic HA exercise. Ventilatory equivalent for oxygen during HA exercise (both acute and chronic) was significantly higher than at SL. GRA

**N82-26968#** Army Research Inst. of Environmental Medicine, Natick, Mass. Altitude Research Div.

### CARDIO-RESPIRATORY PHYSICAL TRAINING IN WATER AND ON LAND

Barbara A. Avellini, Yair Shapiro, and Kent B. Pandolf 12 Jun. 1981 31 p refs
(DA Proj. 3E1-62777-A-878)
(AD-A111064; USARIEM-M-13/81) Avail: NTIS
HC A03/MF A01 CSCL 06/19

Fifteen unconditioned young men, who were similar in maximal aerobic power (VO2 max), were divided into three groups (n = 5 each) and physically trained for one month on a bicycle ergometer either on land (I) on immersed to the neck in water of either 32 C (II) or 20 C (III) to determine how physical training (PT) in water differs from training in air. PT considered of one-hour daily exercise bouts, 5 times/wk, with exercise intensity readjusted each week to maintain a constant training stimulus of approx. 75% VO2 max (determined on land). Throughout the training period, heart rates (HR) of III averaged 20 and 10 beats/min less thn I and II, respectively, despite working at the same VO2 an % VO2 max. Following PT, plasma volume was not increased over the pretraining values ($p > 0.05$) in any group. Hemoglobin concentration and hematocrit significantly increased in all three groups. Training elicited a 16% increase in VO2 max in I compared to increases of 13 and 15% for II and III, respectively. It was conducted that PT in water produces similar physiological adaptations as does training on land. In cold water, VO2 max is improved despite training with HR's significantly lower than those on land. Author (GRA)

**N82-26969#** Army Research Inst. of Environmental Medicine, Natick, Mass. Altitude Research Div.

### SPARING EFFECT OF CHRONIC HIGH-ALTITUDE EXPOSURE ON MUSCLE GLYCOGEN UTILIZATION DURING EXERCISE

A. J. Young, W. J. Evans, A. Cymerman, K. B. Pandolf, and J. J. Knapik 16 Jun. 1981 23 p refs
(DA Proj. 3E1-61102-BS10)
(AD-A111063; USARIEM-M-12/81) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Substrate utilization during heavy (approx. 85% VO2 max) bicycle exercise was examined in eight low-altitude residents at sea level (SL) and after acute (2 hours) and chronic (18 days) exposure to 4,300 m, (HA). Mean VO2 max was approx. 27% lower with acute HA than at SL and did not change significantly with continued HA exposure. Biopsies from the vastus lateralis muscle and venous blood samples were obtained before and after 30 min of exercise, while determinations of the respiratory exchange ratio (R) were made at 10 min intervals during each of the submaximal bouts. Resting serum levels of free fatty acids, unchanged with exercise, were 2X and 3X higher than SL with acute and chronic HA, respectively. Exercise did not alter resting serum glycerol levels at SL or during acute HA, but caused an 11-fold increase during chronic HA. Mean blood lactate concentrations were similar following exercise at SL and acute HA but were 87% lower after chronic HA. During exercise at SL and acute HA, the rate of muscle glycogen utilization and R were similar but were 41% and 15% lower, respectively, with chronic HA. These data suggest that after chronic high-altitude exposure, increased mobilization and use of free fatty acids during exercise resulted in sparing of muscle glycogen. Author (GRA)

**N82-26970#** Army Research Inst. of Environmental Medicine, Natick, Mass. Altitude Research Div.

### MEDICAL AND PERFORMANCE PROBLEMS OF ACUTE HIGH ALTITUDE-EXPOSURE

John T. Maher 11 Jul. 1981 16 p refs
(DA Proj. 3E1-62777-A-879)
(AD-A111062; USARIEM-M-19/81) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Of the numerous medical problems associated with acute exposure to high terrestrial elevations, the Army's research efforts have focused principally, though not exclusively, on the most common of the disorders, acute mountain sickness (AMS) or soroche. This self-limiting syndrome of unacclimatized individuals is characterized by headache, lassitude, insomnia, gastrointestinal symptoms and general malaise which usually become manifest within 4 to 8 hours after arrival, peak between 24 and 48 hours and gradually remit over 4 to 8 days. Experience at our Pikes Peak Laboratory (4,300 meters) indicates that approximately 60 percent of the soldiers so exposed experience symptoms severe enough to functionally incapacitate them as efficient combat troops. At altitudes higher than 4,300 meters one can expect a disproportionate increase in both the severity of symptoms and the number of individuals in whom they will occur. Research efforts at our laboratory to prevent this illness have met with some success; we are now able to reduce symptom intensity at 4,300 meters by 85% through a combination of residence for 4 days at 1,600 meters plus the administration of 500 mg of acetazolamide b.i.d. for the last 2 days at 1,600 meters and the first 2 days at 4,300 meters. GRA

**N82-26971#** Army Research Inst. of Environmental Medicine, Natick, Mass.

### AN ERGOMETER FOR CONCENTRIC AND ECCENTRIC MUSCULAR CONTRACTION

Howard G. Knuttgen, John F. Patton, and James A. Vogel 18 Aug. 1981 16 p refs Submitted for publication
(AD-A111061; USARIEM-M-20/81) Avail: NTIS
HC A02/MF A01 CSCL 06/16

An ergometer for human subjects is described which can be used for leg cycling exercise at low to very high intensities involving concentric or eccentric muscle contractions. Dependent upon the mode of exercise (concentric or eccentric) and rpm chosen, the upper limit of power production approximates 1,500 W. The ergometer permits the study of full ranges of exercise intensities for both types of exercise which, for the concentric condition, includes a high component of anaerobic energy release. Author (GRA)

**N82-26972#** Army Research Inst. of Environmental Medicine, Natick, Mass.

### ISOKINETIC, ISOMETRIC, AND ISOTONIC STRENGTH RELATIONSHIPS

Joseph J. Knapik, James E. Wright, Roberta H. Mawdsley, and Joanne M. Braun 14 Aug. 1981 21 p refs Submitted for publication

(AD-A111039; USARIEM-M-18/81) Avail: NTIS HC A02/MF A01 CSCL 06/5

The relationships among isokinetic, isometric and isotonic strength measurements in knee and elbow extension and flexion were examined in 16 young, healthy males. Isokinetic (36 deg/sec, 108 deg/sec, 180 deg/sec) and isometric torque measurements were obtained from a modified Cybex II apparatus. An elecrogoniometer was used to monitor the joint angle. A modified N-K device was employed to determine maximal isotonic capabilities using a one repetition maximum procedure. Correlations among the three testing modes at the joint angles of peak isometric torque were generally high (bar x = 0.78, range = 0.97 to 0.47) for all four muscle groups. The amounts of common variance suggested that all three strength testing modes were measuring a similar phenomemon which could be termed maximal voluntary strength. Within a particular muscle group, correlations decreased both as the isokinetic velocities and as the joint angles became more widely separated. Author

**N82-26973#** Army Research Inst. of Environmental Medicine, Natick, Mass. Exercise Physiology Div.

**INFLUENCE OF FIBER TYPE COMPOSITION AND CAPILLARY DENSITY ON ONSET OF BLOOD LACTATE ACCUMULATION**

P. A. Tesch (Karolinska Hospital, Stockholm), D. S. Sharp, and W. L. Daniels 25 Mar. 1981 20 p refs Submitted for publication

(AD-A111038; USARIEM-M-8/81) Avail: NTIS HC A02/MF A01 CSCL 06/16

Onset of blood lactate accumulation (OBLA) was determined in sixteen healthy and physically active men (23-33 yrs) during cycling using a continuous step-wise increased exercise intensity protocol. OBLA was defined as the exercise intensity corresponding to a lactate concentration of 4 mmol per liter of blood. Oxygen consumption, pulmonary ventilation, respiratory quotient (R), heart rate and lactate concentration were monitored during each exercise intensity. Muscle biopsies were obtained from m-vastus lateralis at rest for determination of fiber type composition and capillary density. Calculated values (mean + or - SD) for exercise intensity, oxygen consumption and ventilation at OBLA were 159 (+ or - 37)W, 2.43(+ or 0.47) liters per min and 49.8(+ or - 10.5) liters per min or 65(+ or - 10) percent of V sub O sub 2 max OBLA (percent V sub O 2 max) was found to correlate significantly (r = 0.75, p less than 0.001) to the relative muscle area occupied by ST (Type I) fibers. Furthermore, 92% of the variance in OBLA could be explained by percent ST area + capillary density. It is suggested that both inherent and adaptative qualities of the exercising muscle are of significance for the onset of blood lactate accumulation. GRA

**N82-26974#** Army Research Inst. of Environmental Medicine, Natick, Mass. College of Allied Health Professions.

**PERCEPTION OF EFFORT DURING ISOMETRIC CONTRACTIONS AS RELATED TO HEART RATE AND BLOOD PRESSURE RESPONSES**

Leslie I. Goldberg, D. Joyce White, and Kent B. Pandolf (Army Research Inst. of Environmental Medicine) 20 May 1981 29 p refs

(DA Proj. 3E1-62777-A-878)

(AD-A111033; USARIEM-M-15/81) Avail: NTIS HC A03/MF A01 CSCL 06/16

The purpose of this study was to investigate the effects of three intensities of isometric handgrip contractions on selected cardiovascular parameters and perception of effort, and to determine the relationship of these cardiovascular parameters to perception of effort. GRA

**N82-26975#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTS OF ACUTE PLASMA VOLUME EXPANSION ON ALTERING EXERCISE HEAT PERFORMANCE**

Michael N. Sawka, Roger W. Hubbard, Ralph Francesconi, and Donald H. Horstman 16 Dec. 1981 33 p refs

(DA Proj. 3E1-61102-BS-10)

(AD-A110558; USARIEM-M-11/82) Avail: NTIS HC A03/MF A01 CSCL 06/19

To determine the effect an acute plasma volume expansion has upon exercise performance in the heat, seven male volunteers attempted to complete two 90 min walks (40% of VO2 max) in a hot/dry (45 C/20% rh) environment. These walks were preceded by an infusion of either human albumin (50 g in a 200 ml solution) or isotonic saline (200 ml). The albumin infusion was found to significantly ($P < 0.01$) increase plasma volume by about 13%. In comparison to preexercise levels, plasma volume did not change during the duration of both prolonged walks. No significant differences were found for performance time, final heart rate or final rectal temperature values between the two walks. In general, significant differences were not found for systolic blood pressure, rectal temperature, mean skin temperature, heat storage, sweat rate, plasma lactate, plasma osmolality or plasma protein content values between the two walks. However, heart rate responses were found to be signficantly lower ($P < 0.05$; about 13 bpm) during the 25 min and 40 min measurements of the albumin walk. These data suggest that plasma volume expansion may be a supportive adaptation to enhance cardiovascular stability, but does not improve thermoregulatory function or exercise performance in the heat. GRA

**N82-26976#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTS ON HEAT TOLERANCE OF PHYSICAL TRAINING IN WATER AND ON LAND**

Barbara A. Avellini, Yair Shapiro, S. M. Fortney, and Kent B. Pandolf 19 Nov. 1981 33 p refs

(DA Proj. 3E1-62777-A-878)

(AD-A110556; USARIEM-M-6/82) Avail: NTIS HC A03/MF A01 CSCL 06/19

A 4-week training program was undertaken by 15 untrained, unacclimated males who were divided into 3 groups matched on maximal aerobic capacity (VO2 max) and trained either in water or on land to determine how physical training (PT) in these different media affects heat tolerance. Subjects trained on a bicycle ergometer for 1 h/day, 5 days/week at 75% VO2 max, with the exercise intensity progressively increased to maintain a constant training stimulus. Group I exercised on land, while II and III exercised while immersed to the neck in water of either 32 C (II) or 20 C (III). Daily exercise increased core temperature (Tc) in I and II, but not in III. Training elicited similar increases (approx. 15%) in VO2 max in the 3 groups. Before and after PT, all subjects exercised at approx. 30% VO2 max for 3 h at 49 C, 20% rh. Compared to before training, I and II showed a decrease in final Tc and heart rate (HR) in the post-training heat exposure. Seat rate (SR) increased 25% in II, but remained the same in I. Group III demonstrated a decrease in final HR but final Tc was higher than before training. SR did not increase in III and was lower than the other groups. It was concluded that PT can improve the cardiovascular response to dry heat without affecting thermoregulatory capacity. PT appears to enhance heat tolerance only if Tc is permitted to rise during exercise, thus stimulating the temperature-regulating center for heat dissipation. GRA

**N82-26977#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**DOES HEAT ACCLIMATION LOWER THE RATE OF METABOLISM ELICITED BY MUSCULAR EXERCISE**

Michael N. Sawka, Kent B. Pandolf, Barbara A. Avellini, and Yair Shapiro 19 Aug. 1981 25 p refs

(DA Proj. 3E1-62777-A-878)

(AD-A110555; USARIEM-M-5/82) Avail: NTIS HC A02/MF A01 CSCL 06/19

Investigations were evaluated to determine if season (summer or winter) of year and subject gender further influence the effect heat acclimation has on metabolism (M) during exercise. Volunteers completed standardized treadmill walks in hot (40 C, 30% rh or 49 C, 20% rh) and cool (20 C, 40% rh) environments immediately before and after heat acclimation. After heat acclimation, a lower M was observed in the hot environments and in the cool environment. Season of year and subject gender did not have a significant effect on these results. These ata indicate that heat acclimation does lower the M elicited by exercise. The observed percent decrease was lower in the hot (-3%) than cool (-5%) test environments. Physiological mechanisms which could have contributed to this decreased M were an improved muscular efficiency and altered motor unit recruitment patterns. T.M.

**N82-26978#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

**THE BEGINNINGS OF AEROMEDICAL ACCELERATION RESEARCH Final Report**

Harald J. VonBeckh 30 Sep. 1981 42 p refs

(ZF61412001)

(AD-A111048; NADC-81281-60) Avail: NTIS HC A05/MF A01 CSCL 06/19

In the early twenties, when structural strength, maneuverability and power of aircraft had increased sufficiently, grey-out and black-out made their first undesirable appearance during flight. Temporary loss of vision was first observed in test flights conducted by the National Advisory Committee for Aeronautics (NACA) with the 'novel' aircraft Fokker PW-7 and also in air races during and/or after the pilots rounded the pylons. At first only a small sector of the aeromedical community was attracted to do research into this new field. The early contributions of Garsaux (1919), Doolittle (1924), Bauer (1926), Dobrotvorski (1930), Flamme (1931), and von Diringshofen (1932), are reviewed and discussed. Several misquotations, partly caused by faulty translations, are clarified. It becomes apparent that the exchange of information between the aeromedical investigators, as well as between engineering and aeromedical community, was far from satisfactory. This may be the reason that more than one decade passed before the mechanism of visual impairment was understood and the hemostatical theory by von Diringshofen was established, experimentally proven and generally accepted. Author (GRA)

**N82-26979#** Sandia Labs., Albuquerque, N. Mex.

**MODELS FOR THE ESTIMATION OF INCAPACITATION TIMES FOLLOWING EXPOSURES TO TOXIC GASES OR VAPORS**

G. J. Smith 1981 20 p
(Contract DE-AC04-76DP-00789)
(DE82-000619; SAND-81-2197C) Avail: NTIS HC A02/MF A01

Based on the various physiological and toxicological effects that can occur, a set of four models was developed to predict the time to incapacitation from exposure to toxic gases. The four models encompass the range of effects which can lead to immediate incapacitation. These models use historical accident data from incapacitating human exposures or experimentally determined incapacitation data for animals. An alternate model was developed for use when direct incapacitation data are not available. The time to incapacitation is predicted using mortality dose data for animals. DOE

**N82-26980#** Bureau of Radiological Health, Rockville, Md.

**EMISSION COMPUTED TOMOGRAPHY: THE SINGLE PHOTON APPROACH**

Peter Paras and Edward A. Eikman Aug. 1981 322 p refs
Symp. held at Washington, D.C., 9-12 Mar. 1980
(PB82-131285; FDA/BRH-81/112) Avail: NTIS HC A14/MF A01 CSCL 06L

Single photon emission computed tomography (SPECT) was discussed. Information on current SPECT techniques are outlined. Current views on different types and clinical applications of SPECT are presented. GRA

**N82-26981#** Logicon, Inc., San Diego, Calif. Tactical and Training Systems Div.

**OBJECTIVES HIERARCHY FOR AIR INTERCEPT CONTROLLER PROTOTYPE TRAINING SYSTEM Final Report, 28 Sep. 1978 - 28 Jun. 1981**

Robin Halley, J. Thel Hooks, Jr., Harry G. Lankford, and Larry H. Nowell Dec. 1981 212 p refs
(Contract N61339-78-C-0182)
(AD-A110847; Rept-8641-A005) Avail: NTIS HC A10/MF A01 CSCL 05/9

This is the second report of a series describing the design, implementation, and tests of the use of computer speech recognition technology in the tactical training area. The technical issues in psychology, training, and speech recognition will require a highly complex integration effort in order to be successful. This report provides the details required in order to develop a syllabus. Objectives are arranged in hierarchies to depict their interrelationships. An alternate numbers table indicates objectives required on more than one higher level objective. It will be the task of the syllabus development effort to teach these objectives in a sequence which provides training cost effectiveness and efficient skill acquisition. More tasks are included here than are taught now, but none of these tasks are irrelevant to the AIC. The prototype system developed from these objectives will serve as a test vehicle for incorporation of advanced technologies into the specifications of follow-on trainers. Fleet personnel will play a major role in the design and evaluation of the prototype, and thereby play a major role in the selection of the advanced technologies. The training enhancements evolving from this process will maintain the Navy's image as a leader in training systems. GRA

**N82-26982#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**PROJECT STEAMER: 6. ADVANCED COMPUTER-AIDED INSTRUCTION IN PROPULSION ENGINEERING Interim Report, Mar. 1980 - Feb. 1981**

Albert Stevens, Bruce Roberts, Larry Stead, Kenneth Forbus, Cindy Steinberg, and Brian Smith Jan. 1982 27 p refs
(Contract N00123-81-D-0794)
(AD-A110797; NPRDC-TR-82-28) Avail: NTIS HC A03/MF A01 CSCL 05/9

At present, propulsion engineering training is a major problem for the Navy. NAVPERSRANDCEN's goal is to build an intelligent computer-aided instruction (ICAI) training system to enhance Navy training in this area and evaluate the potential of new computer-based technology to provide a qualitatively different form of training. The STEAMER project is concerned with the design and implementation of a training system to instruct personnel in the principles of propulsion engineering. Operational personnel need to understand these principles of plant operation in order to remember the multitude of procedures required for safe plant operation and to be able to respond to a myriad of potential casualty conditions. GRA

**N82-26983#** Air Force Human Resources Lab., Brooks AFB, Tex. Manpower and Personnel Div.

**APTITUDE REQUIREMENTS BASED ON TASK DIFFICULTY: METHODOLOGY FOR EVALUATION Interim Report, 1975 - 1980**

Lloyd D. Burtch, M. Suzanne Lipscomb, and Dale J. Wissman Jan. 1982 38 p refs
(AF Proj. 7719)
(AD-A110568; AFHRL-TR-81-34) Avail: NTIS HC A03/MF A01 CSCL 05/9

The development and application of a technology designed for the evaluation of the difficulty of Air Force jobs in conjunction with the aptitude level required for the job is described. The technology developed makes use of computed variables and task factor data collected by the Air Force Occupational Measurement Center as well as benchmark difficulty data collected by contract personnel experts for the specialties under study. The application of this technology provides a unique method of determining and comparing the learning difficulty of Air Force tasks and jobs, both within and across career specialties. Analyses have indicated high interrater reliabilities for both supervisory and benchmark ratings. A two-variable multiple regression equation was developed for each of the specialties studied. Relatively high correlations were obtained between the two ratings indicating that independent raters tend to agree with supervisors. These questions resulted in estimates of average task difficulty per unit time (ATDPUT) values for each job in each specialty. The value of these estimates and implications for their use are discussed. Author (GRA)

**N82-26984#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**EFFECTS OF WHOLE-BODY MOTION SIMULATION ON FLIGHT SKILL DEVELOPMENT Final Report, 1 Jun. 1978 - 30 Sep. 1981**

William H. Levison Oct. 1981 149 p refs
(Contract F49620-78-C-0073; AF Proj. 2313)
(AD-A111115; BBN-4645; AFOSR-82-0066TR) Avail: NTIS HC A07/MF A01 CSCL 05/9

Progress was made toward the development of models for piloting skill acquisition. The following tasks were accomplished; (1) design of an experiment to study visual and motion cue integration in a multi-axis control tasks; (2) enhancement of the optimal control pilot model; (3) further development of a scheme for automatic identification and significance testing of 'pilot-rated' model parameters; (4) analysis of control strategy development; (5) study of the relationship between task structure and pilot response limitations; (6) test of a multiplicative motor noise model; and (7) a brief literature search on adaptive control and identification algorithms for potential application to models for control-strategy development. Author (GRA)

**N82-26985#** Massachusetts Univ., Amherst. Lab. of Psychometric and Evaluative Research.

**LATENT TRAIT MODEL CONTRIBUTIONS TO CRITERION-REFERENCED TESTING TECHNOLOGY Final Report**

Ronald K. Hambleton Brooks AFB, Tex. AFHRL Feb. 1982

31 p refs
(Contract F33615-79-C-0020; AF Proj. 2313)
(AD-A112048; AFHRL-TP-81-33) Avail: NTIS
HC A03/MF A01 CSCL 05/10

The goals and results of an 18-month study addressing latent trait model applications to measurement problems arising in criterion-referenced testing are presented. The research studies described in the report cover the following areas: (a) problems with classical test models; introduction to latent trait models, features, assumptions, parameter estimation, and test and item information curves; building tests with latent trait models; (b) latent ability scales - uses, interpretations, and properties; equating test scores for using a common set of norms tables; approaches for addressing the goodness of fit between a latent trait model and a data set; (c) comparing the one-parameter and three-parameter logistic models for ability estimation and decision-making with several test lengths and ability levels; (d) determining the optimal length of criterion-referenced tests with different types of item pools (varying the level of item heterogeneity) and using two different item selection methods; (e) a system to allow instructors to specify required level of measurement precision and obtain information to help them determine test length; (f) comparing the fit of the one-parameter and three-parameter models to 25 sets of test data; and (g) building banks of valid test items. Author (GRA)

**N82-26986#** Missouri Univ., Columbia. Tailored Testing Research Lab.
**THE FORMATION OF HOMOGENEOUS ITEM SETS WHEN GUESSING IS A FACTOR IN ITEM RESPONSES**
Mark D. Reckase Aug. 1981 94 p refs
(Contract N00014-77-C-0009; NR Proj. 150-395; RR0420401)
(AD-A107134; RR-81-5) Avail: NTIS HC A05/MF A01 CSCL 12/1

One of the major assumptions of latent trait theory is that the items in a test measure a single dimension. This report describes an investigation of procedures for forming a set of items that meet this assumption. Factor analysis, nonmetric multidimensional scaling, cluster analysis and latent trait analysis were applied to simulated and real test data to determine which technique could best form an unidimensional set of items. Theoretical and empirical evaluations were also made of the effects of guessing on the dimensionality of test data. The results indicated that guessing affected highly discriminating items more so than poorly discriminating items. However, the effect of guessing on the dimensionality of tests with common distributions of difficulty and discrimination indices was found to be minimal. Of the procedures evaluated for sorting items into unidimensional item sets, principal factor analysis of phi coefficients gave the best results overall. Nonmetric multidimensional scaling also showed promise when used with Yule's Y, phi, or tetrachoric similarity coefficients, but it did not perform as well as the factor analytic techniques on the real test data. In summary, guessing does have an effect on test data, but the effect is not very large unless items of extreme difficulty are present in the test. Of the procedures evaluated, traditional factor analytic techniques gave the most useful information for sorting test items into homogeneous sets. Author (GRA)

**N82-26987*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PRESSURE SUIT JOINT ANALYZER Patent**
Hubert C. Vykukal and Bruce W. Webbon, inventors (to NASA) Issued 19 Jan. 1982 7 p Filed 11 Jul. 1980 Supersedes N80-30042 (18 - 20, 2756)
(NASA-Case-ARC-11314-1; US-Patent-4,311,055; US-Patent-Appl-SN-168943; US-Patent-Class-73-862.08) Avail: US Patent and Trademark Office CSCL 06K

A measurement system for simultaneously measuring torque and angular flexure in a pressure suit joint is described. One end of a joint under test is held rigid. A torque transducer is pivotably supported on the other movable end of a joint. A potentiometer is attached to the transducer by an arm. The wiper shaft of the potentiometer is gripped by a reference arm that rotates the wiper shaft the same angle as the flexure of joint. A signal is generated by the potentiometer which is representative of the joint flexure. A compensation circuit converts the output of the transducer to a signal representative of joint torque. Official Gazette of the U.S. Patent and Trademark Office

**N82-26988*#** George Washington Univ. Medical Center, Washington, D.C.
**INSECTS: A NUTRITIONAL ALTERNATIVE**
Patricia A. Dufour 1981 66 p refs
(Contract NASw-3165)
(NASA-CR-169056; NAS 1.26:169056) Avail: NTIS
HC A05/MF A01 CSCL 06H

Insects are considered as potential food sources in space. Types of insects consumed are discussed. Hazards of insect ingestion are considered. Insect reproduction, requirements, and raw materials conversion are discussed. Nutrition properties and composition of insects are considered. Preparation of insects as human food is discussed. N.W.

**N82-26989#** Naval Coastal Systems Center, Panama City, Fla. Life Support Systems Div.
**CARBON DIOXIDE ABSORPTION CHARACTERISTICS OF HIGH PERFORMANCE SODASORB AT 1 ATMOSPHERE Technical Memo, FY 1980-1981**
A. Purer, G. A. Deason, M. I. Nuckols, and J. F. Wattenbarger
Oct. 1981 22 p
(AD-A107488; AD-F200014; NCSC-TM-327-81) Avail: NTIS
HC A02/MF A01 CSCL 06/11

Standardized methods have been developed to evaluate the efficiency of different carbon dioxide absorbents. Effects of moisture, absorbent cell dimensions, linear velocity, and temperature have been included in this investigation. The use of such standardized procedures will allow data comparisons which have not been possible. The engineering data should also be directly applicable to future canister design. GRA

**N82-26990#** Electro-Voice, Inc., Buchanan, Mich.
**ADVANCED DESIGN LINEAR NOISE-ATTENUATING EARPHONE-EARCUP SYSTEM Final Report, Jun. 1980 - Jul. 1981**
Robert B. Jackson Aug. 1981 42 p refs
(Contract DAAK80-80-C-0556)
(AD-A110820; CECOM-80-0556F) Avail: NTIS
HC A03/MF A01 CSCL 06/17

This document covers the development of a headset designed to improve intelligibility and reduce ear fatigue of combat vehicle crewmen in armored vehicles. It is electrically equivalent to the Mk-1697/G kit, but is self supporting and is not designed to fit any particular helmet. Author (GRA)

**N82-26991#** Northrop Corp., Hawthorne, Calif. Aircraft Div.
**CREW WORKLOAD PREDICTION STUDY Final Report, 1 Jul. 1980 - 15 Dec. 1981**
J. F. Watler, Jr., D. W. Rowell, S. S. Janoski, and Larry C. Butterbaugh (AFWAL) Wright-Patterson AFB, Ohio AFWAL Dec. 1981 109 p refs
(Contract F336615-80-C-3618; AF Proj. 2403)
(AD-A111948; AFWAL-TR-81-3140) Avail: NTIS
HC A06/MF A01 CSCL 01/3

This report documents a study which applied an analytic method known as the Controls and Display Evaluation Model, or CODEM, to the flight deck avionics improvements identified in the Flight Control Division's (AFWAL/FIGR) Tanker Avionics and Aircrew Complement Evaluation (TAACE) program. TAACE, in support of the USAF KC-135 Avionics Modernization Program, sought to establish design criteria for the controls and displays of improved avionics, in the event the crew of the KC-135 is reduced by eliminating the navigator. The objective of this study was to apply CODEM to a previously evaluated design, so that the resulting data could be used to evaluate the validity of CODEM by comparing the two sets of data. CODEM, which is still in the developmental stage, embodies a 'limit design' approach to the problem of controls and displays engineering and integration. Absolute design limits and progressive tests are used to test the emerging design in terms of task complexity. CODEM output consists of plots of task complexity vs. time and a printout of associated equipment-related tasks which allows the designer to diagnose the source of any undersirable crew loading. CODEM's application to the TAACE flight deck design concluded that the air-refueling mission could be performed without excessive workload on the crew. GRA

**N82-26992#** Army Research Inst. of Environmental Medicine, Natick, Mass.
**ANATOMIC PERSPECTIVE OF THE FEMALE ATHLETE: AN APPROACH TO MUSCULOSKELETAL PROFILING OF**

**WOMEN IN SPORTS**

Connie Bauman (Wellesley Coll.), Joseph J. Knapik, Bruce H. Jones, John M. Harris (Veterans Administration Hospital, Boston), and Linda K. Vaughn 11 Jan. 1982 22 p refs

(AD-A110630; USARIEM-M-8/82) Avail: NTIS HC A02/MF A01 CSCL 06/5

Women's sports did not begin to grow and gain public recognition until the early 1970's. Since then, the number of women participating in intercollegiate sports has doubled and the number of girls participating in interscholastic sports programs has increased almost threefold. As women flood the sports arena, many questions arise regarding the female athlete. Their performance capabilities are constantly compared with male athletic records and standards, and explanations for the difference in their level of performance are being sought. GRA

**N82-26993#** Army Aeromedical Research Lab., Fort Rucker, Ala. Visual Science Group.

**DIRECT AND NEIGHBORING SENSITIVITY CHANGES PRODUCED BY RED AND BLUE-WHITE ADAPTING FIELDS**

Franklin F. Holly and Virgil R. Rogers Feb. 1982 24 p refs Presented at the Tri-Service Aeromed. Res. Panel, Pensacola, Fla., 12-13 Dec. 1979

(DA Proj. 3M1-61102-BS-10)

(AD-A111880; USAARL-82-1) Avail: NTIS HC A02/MF A01 CSCL 01/3

Observers viewed Army instrument panel lighting red and Air Force instrument panel lighting blue-white adaptation fields and their thresholds were determined both within the adaptation field and outside of it. In some cases, thresholds were determined while the adaptation field was still on and in other cases they were determined after the adaptation field had been off for 10 seconds. GRA

**N82-26994#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTIVENESS OF FIVE WATER-COOLED UNDERGARMENTS IN REDUCING HEAT STRESS OF VEHICLE OPERATING IN A HOT WET OR HOT DRY ENVIRONMENT**

George F. Fonseca Mar. 1981 50 p refs

(DA Proj. 3E1-62777-A-878)

(AD-A107105; USARIEM-T-2/81) Avail: NTIS HC A03/MF A01 CSCL 06/17

The auxiliary cooling provided by five water cooled undergarments was directly measured on a life size, sectional manikin. Each water cooled undergarment was worn with a combat vehicle crewman ensemble, with or without a complete chemical protective suit. Cooling rates (watts) were determined for both dry (nonsweating) and completely wet (maximal sweating) skin conditions. The watts of heat removed from either the dry of the completely wet skin surface were almost directly proportional to the temperature difference between the manikin skin temperature and the cooling water inlet temperature; the cooling represents the absorption of heat directly from the body, plus any heat that is received by the body from a hot environment. The cooling density, expressed in watts of cooling per square meter of cooling tube array, differed with the size of the array and with the location of the skin surface it covered. GRA

**N82-26995*#** National Aeronautics and Space Administration, Washington, D. C.

**PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1981: A SPECIAL BIBLIOGRAPHY**

Linda G. Pleasant, comp. (George Washington Univ.) and Donald L. DeVincenzi, comp. Jun. 1982 35 p

(NASA-TM-84895; NAS 1.15:85895) Avail: NTIS HC A03/MF A01 CSCL 06C

The exobiology program investigates the planetary events which were responsible for, or, related to, the origin, evolution, and distribution of life in the universe. The areas involved include: chemical evolution, organic geochemistry, origin and evolution of life, planetary environments, life in the universe, planetary protection, and Mars data analysis. S.L.

**N82-27962*#** Department of Agriculture, College Station, Calif. Pest Control Equipment and Methods Research Unit.

**PREDICTING THE TIMING AND POTENTIAL OF THE SPRING EMERGENCE OF OVERWINTERED POPULATIONS OF HELIOTHIS spp Final Report, 1 Oct. 1980 - 31 Mar. 1981**

Albert W. Hartsteck, John A. Witz, and Juan D. Lopez 31 Mar. 1981 36 p refs

(NASA Order T-4629H)

(NASA-CR-167444; NAS 1.26:167444) Avail: NTIS HC A03/MF A01 CSCL 06C

Current literature was reviewed in detail. Temperature and day length are the primary factors which program H. spp. larve for possible diapause. Mortality during diapause is reported as highly variable. The factors causing mortality are identified. Sufficient data was collected to allow the development of mathematical models which predict the timing of emergence. Timing predictions compare favorably to observed field data; however, prediction of actual numbers of emerging moths was not possible. The potential for use of spring emergence predictions in pest management applications, as an early warning of potential crop damage, are excellent. Research requirements to develop such an early warning system are discussed. T.M.

**N82-27963*#** National Aeronautics and Space Administration, Washington, D. C.

**THE EVALUATION OF STUDIES OF FLIGHT PERSONNEL OF THE GERMAN LUFTHANSA ON THE QUESTION OF STRESS DURING FLIGHTS ON THE SHORT EUROPEAN ROUTES**

K. E. Klein, H. Bruener, P. Kuklinski, S. Ruff, and H. M. Wegmann Feb. 1982 39 p refs Transl. into ENGLISH from German report Rept-DLR-355-74/2 DFVLR, Oberpfaffenhofen, West Germany, 1972 34 p Original language document announced as N77-80915 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76660; NAS 1.15:76660) Avail: NTIS HC A03/MF A01 CSCL 06S

Medical studies were undertaken on the stress experience by the cockpit crew working the short routes in Europe and a special attempt was made to discover whether signs of a summation of stress due to flight work become visible during a circuit of several days. For this purpose the pulse and respiratory rates were determined for 22 crew members as an indication of the acute stress occurring during the flight and the amount of stress hormone in the urine as an indication of the extent of total stress in an extended study period. Author

**N82-27964*#** Tennessee Univ., Memphis. Materials Science Toxicology Labs.

**TOXICITY OF THERMAL DEGRADATION PRODUCTS OF SPACECRAFT MATERIALS Final Report, 10 Nov. 1980 - 9 May 1982**

W. H. Lawrence, J. E. Turner, Caroline Sanford, Sam Foster, Eula Baldwin, and Jacqueline OConnor 7 May 1982 138 p refs

(Contract NAS9-15670)

(NASA-CR-167615; NAS 1.26:167615) Avail: NTIS HC A07/MF A01 CSCL 06T

Three polymeric materials were evaluated for relative toxicity of their pyrolysis products to rats by inhalation: Y-7683 (LS 200), Y-7684 (Vonar 3 on Fiberglass), and Y-7685 (Vonar 3 on N W Polyester). Criteria employed for assessing relative toxicity were (1) lethality from in-chamber pyrolysis, (2) lethality from an outside-of-chamber pyrolysis MSTL Procedure, and (3) disruption of trained rats' shock-avoidance performance during sub-lethal exposures to in-chamber pyrolysis of the materials. Author

**N82-27965#** Beth Israel Hospital, Boston, Mass. Orthopedic Biomechanics Lab.

**FRACTURE AND VISCOELASTIC CHARACTERISTICS OF THE HUMAN CERVICAL SPINE KINEMATICS OF THE 3 ACTUATOR SYSTEM**

W. C. Hayes, A. A. White, W. T. Edwards, and J. Lelli Aug. 1981 135 p refs

(Contract F49620-81-K-0010; AF Proj. 2312)

(AD-A110980; AFOSR-82-0041TR) Avail: NTIS HC A07/MF A01 CSCL 06/19

An analysis of the actuator kinematics and the load generation capabilities was performed. The kinematic behavior of the Planar Motion Material Testing (PMMTA) actuators was analyzed using a computational algorithm written for a MINC-11-03 computer and a TK4010 plotting terminal. The analysis addressed: (1) the range of motion of the test stage considering various angular

orientations of the test stage for the most acceptable design, and (2) the calculation of max loads in the vertical, horizontal and rotational directions for each position of the test stage.
Author

**N82-27966#** Army Aeromedical Research Lab., Fort Rucker, Ala.
**PREVALENCE OF ASTIGMATISM AMONG AVIATORS AND ITS LIMITING EFFECT UPON VISUAL PERFORMANCE WITH THE AN/PVS-5 FLIGHT VISION GOGGLES**
Hanson J. Kim 2 Mar. 1982 7 p
(AD-A112836) Avail: NTIS HC A02/MF A01 CSCL 06/5

Emphasis on sustained operations during periods of darkness is steadily increasing. Presently, the AN/PVS-5 Night Vision Goggles (NVG) are utilized for night operations. The primary concern with these goggles is the astigmatism criterion since this, unlike spherical refractive errors, is not compensated by the NVG. The NVG have only an adjustable range of +2.00 to -6.00 diopters to correct for spherical error. No provisions were incorporated into the design of the NVG to allow correction of astigmatic error. Consequently, an aviator with a significant amount of astigmatism will have reduced visual acuity which will affect his operational performance. A study was undertaken to identify the number of rated aviators at the Army Aviation Center with detected astigmatism in order to assess the magnitude of this particular problem and to determine whether or not the current standards for astigmatism are sufficient for the aviators who are using the AN/PVS-5 Night Vision Goggles. GRA

**N82-27967#** Rutgers - The State Univ., New Brunswick, N. J. Dept. of Psychology.
**EYE MOVEMENTS AND VISUAL INFORMATION PROCESSING Final Report**
Eileen Kowler 16 Dec. 1981 12 p refs
(Contract F49620-81-K-0008; AF Proj. 2313)
(AD-A112399; AFOSR-82-0137TR) Avail: NTIS HC A02/MF A01 CSCL 06/16

Eye movements determine the location and velocity of the retinal image. Thus, to understand how we see it is necessary to understand both how eye movements are controlled and how they affect visual information processing. The proposed research is concerned with both problems, specifically: (1) the effect of expectations on smooth eye movements; (2) the effect of saccades and saccade-like stimulus perturbations on visual information processing; and (3) programming sequences of saccades. GRA

**N82-27968#** Utah State Univ., Logan. Dept. of Biology.
**AN EVALUATION OF LOCALIZED SWEATING RATES FOR PREDICTING TOTAL BODY SWEATING RATES Final Scientific Report**
James A. Gessaman Dec. 1981 31 p refs
(Grant AF-AFOSR-0276-80; AF Proj. 2312)
(AD-A111902; AFOSR-82-0109TR) Avail: NTIS HC A03/MF A01 CSCL 06/19

This project accessed the accuracy of estimating whole body sweating rates (WBSR) from local sweating rates (LSR) measured with sweat collection capsules containing filter paper. Sweat was collected in capsules strapped on five locations of the body: (1) midforehead, (2) superiorflexor side of the right forearm, (3) left pectoralis major, (4) medial midsection of the left thigh, and (5) upper medial side of the left calf. Sweating rates of 10 male subjects were measured while they rested at an air temperature of 39.4 C and 58.4% RH, and while they ran on a treadmill at a work output of 60% VO2 max with an air temperature of 35.5 C and 33.2% RH. Among all subjects the WBSR averaged 4.3147 g/min sq m during rest and 7.6062 g/min sq m during exercise. The LSR from any one of the five locations was a poor predictor of WBSR. Multiple regression equations which included LSRs from all five locations gave an r squared > 90 for 5 subjects during rest and exercise. The multiple regression equations derived from the data combined from all subjects was not as good a predictor of WBSR as some of the equations derived for individual subjects, i.e., r squared = 70.3 for data during rest and r squared = 46.1 for data during exercise. Four equations which weighted the LSRs with the corresponding skin area factors provide a poor estimate of WBSR (r squared = 53.9). Author (GRA)

**N82-27969#** Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
**LONG BONE AND JOINT RESPONSE TO MECHANICAL LOADING Final Report, 1 Apr. 1979 - 30 Sep. 1981**
Ali Erkan Engin Nov. 1981 165 p refs
(Contract F49620-79-C-0110; AF Proj. 2312)
(AD-A111551; AFOSR-82-0013TR) Avail: NTIS HC A08/MF A01 CSCL 06/16

The research program presented in this report is concerned with collection of active muscle force and moment response data of the human upper and lower extremities when the extremities are subjected to various external forces. The major components of the specially designed and built experimental apparatus are a subject restraint system, a force application device which employs three sonic emitters, and an upper arm (or upper leg) cuff with four sonic emitters. The sonic emitters are utilized to determine the three dimensional direction and the location of the force application on the limbs and the orientation of the limbs with respect to the torso. Kinematics of relative motion between two body segments is presented in a format suitable for utilization of four sonic emitters on the moving body segment. The numerical results are presented from a set of experiments conducted on three male and three female subjects to determine their active muscle resistance against the external forces to dislodge their limbs from the initial or so-called stowed position. It is concluded that although there are intra- and inter-subject variations for the maximum values of the resistive muscle force and moment data for the limbs, there are some trends one can establish for the behavior of their magnitudes.
GRA

**N82-27970#** Office of Naval Research, London (England).
**THE BIOLOGICAL EFFECTS OF NONIONIZING RADIATION**
J. B. Bateman 29 Dec. 1981 23 p refs Presented at the 10th L. H. Grey Memorial Conf., Oxford, 13-16 Jul. 1981
(AD-A111898; ONRL-C-12-81) Avail: NTIS HC A02/MF A01 CSCL 06/18

This is a critical report on the L.H. Grey Memorial Conference held in Oxford, 13-16 July 1981. The Conference was entitled 'Biological Action of Radiofrequency, Microwave and Ultrasonic Radiations.' The report provides a background identifying the field of interest in broader terms, intended for the general reader. It is then pointed out that the conference was mainly directed toward research and practice related to the possible value of nonionizing radiations in cancer therapy. There were, however, tutorial lectures of a fairly general character and some discussion of biological effects not necessarily arising from production of heat in irradiated tissues. Author (GRA)

**N82-27971#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**FINITE ELEMENT ANALYSIS OF THE VISCO-ELASTIC INTERACTION OF THE ANNULUS FIBROSIS AND NUCLEUS PULPOSIS WITHIN THE HUMAN INTERVERTEGRAL JOINT M.S. Thesis**
Leslie J. Allen Dec. 1981 96 p refs
(AD-A111161; AFIT/GAE/AA/81D-1) Avail: NTIS HC A05/MF A01 CSCL 06/16

An understanding of the mechanical properties and behavior of the intervertebral disc is critical to several current areas of research. Among these are the study of the effects of extreme gravitational forces on the air crews of high performance aircraft and the related problem of spinal injuries due to aircraft ejection. This study was undertaken in order to construct a realistic analytical model of the intervertebral joint using the finite element approach. Experiments have shown that healthy intervertebral joints exhibit creep when subjected to axial load. The focus of this investigation is the behavior and interaction of the nucleus and annulus under loading. An axisymmetric finite element model is employed which incorporates a linear visco-elastic constitutive relation for the annulus and nucleus, based upon a three-parameter Kelvin solid. The visco-elastic constants are found by matching one-dimensional axial experimental data with this two dimensional model. The nucleus, which is composed of a series of concentric lamellae of collagen fibers, has been modelled as a 12ply structure of orthotropic material. GRA

**N82-27972#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**SLEEP AND WAKEFULNESS HANDBOOK FOR FLIGHT MEDICAL OFFICERS**
A. N. Nicholson (Inst. of Aviation Medicine, Farnborough, England) and Barbara M. Stone (Inst. of Aviation Medicine, Farnborough, England) Mar. 1982 89 p

(AGARD-AG-270(E); ISBN-92-835-1416-5) Avail: NTIS
HC A05/MF A01

Sleep and wakefulness related to aircrew and the aviation environment are discussed. Eight topics are covered: alertness and sleep, sleep, Circadian rhythms, shiftwork, transmeridian flight, air operations and irregularity of work, disorders of sleep and arousal, and hypnotics. N.W.

**N82-27973#** Intermagnetics General Corp., Guilderland, N.Y.
**FEASIBILITY STUDY: NMR IMAGING MICROSCOPE Final Report, 1 Sep. 1980 - 28 Feb. 1981**
W. V. House 24 Apr. 1981 114 p refs
(Grant NSF DAR-80-09739)
(PB82-125915; NSF/PCM-81006) Avail: NTIS
HC A06/MF A01 CSCL 06B

The influences of probe geometry were analyzed and quantified for the very small dimensions and high magnetic fields required to examine individual cells and to explore the fundamental differences between normal and abnormal cells for both research and diagnostics. The possibility of sharpening the resonance frequency and improving resolution by simulating the nuclei with appropriate time dependent radio frequency pulses were studied. Analysis shows that the theoretically obtainable resolution in an NMF microscope is limited by Brownian motion of the resonating nuclei along the field gradient that defines surfaces of constant magnetic field. To opitimize resolution, it is necessary to shorten the time duration during which the gradient is applied. Consideration of signal to noise characteristics shows that the best practically obtainable resolution is about 2 pi times greater than the theoretical limit. GRA

**N82-27974#** South Carolina Univ., Columbia. Dept. of Epidemiology and Biostatistics.
**EPIDEMIOLOGY FEASIBILITY STUDY: EFFECTS OF NOISE ON THE CARDIOVASCULAR SYSTEM Final Report**
Shirley J. Thompson Sep. 1981 199 p refs
(Contract EPA-6801-6274)
(PB82-147752; EPA-550/9-81-103) Avail: NTIS
HC A09/MF A01 CSCL 06S

World literature to date and a critical analysis of existing foreign and domestic epidemiological research on the nonauditory physiological effects of noise are reviewed. Literature on hypertension, cardiovascular disease, and general stress are analyzed for its applicability to noise effects epidemiology. Information and recommendations pertinent to substantive and methodological issues related to the design and conduct of future noise effects epidemiology is also provided. GRA

**N82-27975#** South Carolina Univ., Columbia.
**EPIDEMIOLOGY FEASIBILITY STUDY: EFFECTS OF NOISE ON THE CARDIOVASCULAR SYSTEM: APPENDIX B: ANNOTATED BIBLIOGRAPHY. LITERATURE. THE EFFECTS OF NOISE ON THE CARDIOVASCULAR SYSTEM**
Shirley J. Thompson Jul. 1981 248 p
(Contract EPA-68-01-6274)
(PB82-147760; EPA-550/9-81-103B) Avail: NTIS
HC A11/MF A01 CSCL 06S

A bibliography of the world literature on the epidemiologic studies of the effect of noise on the cardiovascular system in man is presented. The assignment of numerical scores and ratings are discussed in the narrative report accompanying this bibliography. The assessment criteria employed, the assessment forms devised for standardization of the critiques and summarizations of the evaluations are included. GRA

**N82-27976#** South Carolina Univ., Columbia.
**EPIDEMIOLOGY FEASIBILITY STUDY: EFFECTS OF NOISE ON THE CARDIOVASCULAR SYSTEM. APPENDIX C: REVIEW OF NON-NOISE RELATED RESEARCH OF CARDIOVASCULAR DISEASE**
Julian E. Keil, David M. Propert, and Shirley J. Thompson Jul. 1981 103 p refs
(Contract EPA-68-01-6274)
(PB82-147778; EPA-550/9-81-103C) Avail: NTIS
HC A06/MF A01 CSCL 06S

Information about the pathology, pathogenesis, and epidemiology of cardiovascular diseases is reviewed. The key cardiovascular diseases, their manifestations, risk factors, etiology of the risk factors and origin of the precipitants of the diseases are discussed. An empirical foundation for subsequent noise related research is provided: (1) current knowledge of the pathogenesis and pathophysiology of the cardiovascular diseases; (2) key confounding and interactive factors to be considered in the design of future studies; and (3) pathways in the pathogenic process and potential entry points for investigation of noise as the environmental influence on the cardiovascular system are included. GRA

**N82-27977#** Navy Personnel Research and Development Center, San Diego, Calif.
**PERFORMANCE TEST OBJECTIVITY: A COMPARISON OF RATER ACCURACY AND RELIABILITY USING THREE OBSERVATION FORMS Technical Report, Dec. 1979 - Apr. 1980**
William A. Nugent, Gerald J. Laabs, and Robert C. Panell Feb. 1982 31 p refs
(ZF63522001)
(AD-A111077; NPRDC-TR-82-30) Avail: NTIS
HC A03/MF A01 CSCL 05/9

The study examined two variables that may influence the consistency and accuracy of rater's judgments in evaluating job performance: (1) the precision with which behaviors to be observed and evaluated are specified on a performance observation form; and (2) the level of proficiency of the rater at the task being evaluated. Videotapes were prepared that depicted both passing and failing performances in the use of two types of electronic test equipments. The videotapes were observed in two experiments by raters who used a structured, semistructured, or unstructured performance observation form. Rater skill level was determined by the score the rater obtained on a performance test that consisted of the same types of electrical measurement problems as shown on the videotape. For both experiments, the presence of at least some structure in a performance observation form produced more accurate and reliable evaluations of job task performance than did a form with no structure. Within the range of rater skill tested, results showed that the level of skill proficiency that raters have with a particular type of electronic test equipment is largely independent of their ability to judge accurately and consistently the performance of others in using the same equipment. Author (GRA)

**N82-27978#** Dunlap and Associates, Inc., La Jolla, Calif.
**TRAINING IMPROVEMENTS FOR THE TACTICAL AIRCREW TRAINING SYSTEM (TACTS): PROJECT SUMMARY REPORT Final Report, Aug. 1978 - Aug. 1980**
A. P. Ciavarelli, A. M. Williams, and G. R. Stoffer Orlando, Fla. Naval Training Equipment Center Sep. 1981 47 p refs
(Contract N61339-78-C-0136)
(AD-A107003; NAVTRAEQUIPC-78-C-0136-3) Avail: NTIS
HC A03/MF A01 CSCL 05/9

This report presents summarized information related to the Tactical Aircrew Combat Training System (TACTS) training improvements program. The two major sections of the report area addressed to: (1) a description of a computer based TACTS debrief system, referred to as the Performance Assessment and Appraisal System (PAAS), and (2) a problem definition study of air intercept missile (AIM) envelope recognition training. The preliminary design of a computer based system has been completed and a single design module, Performance Assessment and Combat Effectiveness (PACE), is ready for operational test and evaluation. Summarized information from a more comprehensive study of U.S. Navy air-to-air missile envelope training problems is included. Recommendations for improving fleet envelope recognition training are reviewed. Author (GRA)

**N82-27979#** Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
**EFFECT OF TASK DURATION ON VOICE RECOGNITION SYSTEM PERFORMANCE**
John W. Armstrong and Gary K. Poock Sep. 1981 71 p refs
(AD-A107442; NPS55-81-017) Avail: NTIS
HC A04/MF A01 CSCL 05/8

This report describes an experiment examining voice recognition performance when subjects were required to make a decision every 1.5 seconds for 20 consecutive minutes while speaking to a voice recognizer at the same time. Results showed mental loading degraded voice recognition performance. Results also showed performance degradation similar to a vigilance decrement over eight trials of 2.5 minutes each. Author (GRA)

**N82-27980#** Naval Postgraduate School, Monterey, Calif.
**EFFECT OF OPERATOR MENTAL LOADING ON VOICE**

**RECOGNITION SYSTEM PERFORMANCE**
Gary K. Poock and J. W. Armstrong Aug. 1981 60 p refs
(Contract N00039-80WR-09041)
(AD-A107477; NPS55-81-016) Avail: NTIS HC A04/MF A01 CSCL 05/8

This report describes an experiment in which military officers used voice recognition under various mental loading conditions. Results showed voice recognition performance degraded as mental loading was imposed on the subjects. Author (GRA)

**N82-27981#** Pittsburg Univ., Pa. Learning Research and Development Center.
**EMPIRICAL STUDIES OF PROCEDURAL FLAWS, IMPASSES, AND REPAIRS IN PROCEDURAL SKILLS**
Kurt VanLehn 5 Feb. 1982 75 p refs Prepared in cooperation with Xerox Palo Alto Research Center
(Contract N00014-79-C-0215; RR042060A; NR Proj. 667-430)
(AD-A113791; TR-ONR-8) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report represents the results of several extensive empirical studies. A group of 925 students who were in the process of learning subtraction were tested using highly diagnostic tests developed by DEBUGGY. Some students were retested two days later to measure the short-term stability of bugs, and others were retested several months later to study long-term stability. All tests were analyzed by DEBUGGY and by several expert diagnosticians in order to assess DEBUGGY'S diagnostic abilities. It was found that DEBUGGY was as good as or better than human diagnosticians at discovering bugs that explain a student's errors. However, a third of the students who committed errors could not be modelled with bugs and slips. Moreover, bugs were found in general to be unstable rather than stable, both in the short term and the long term. These findings challenged the belief that bugs and slips alone could account for procedural error data. Repair Theory was orginally developed as a generative theory of bugs, one that predicted which bugs would exist for a given procedural skill. However, it also predicted that certain kinds of non-bug, non-slip performance would exist, both in the static analyses and the stability data. GRA

**N82-27982#** Texas Christian Univ., Fort Worth. Inst. of Behavioral Research.
**ORGANIZATIONAL CLIMATE: ANOTHER LOOK AT A POTENTIALLY IMPORTANT CONSTANT**
Lawrence R. James 7 Apr. 1982 35 p refs
(Contract N00014-80-C-0315; NR Proj. 170-904)
(AD-A113953; IBR-82-4) Avail: NTIS HC A03/MF A01 CSCL 05/10

Organizational climate is examined from the standpoint of the need to demonstrate interrater reliability (agreement) among individuals' perceptions of psychological climate. It is shown that if prior estimates of interrater reliability are accurate, then organizational climate is a moot issue. It is then demonstrated that at least some prior estimating procedures likely provided underestimates of interrater/perceptual agreement. A new procedure for estimating interrater reliability is suggested and illustrated. The new procedure provided substantially higher estimates of interrater reliability than prior methods. It is concluded that the concept of organizational climate is potentially salvageable, although more attention needs to be given to the appropriate level of explanation for climate variables. Author (GRA)

**N82-27983#** Texas Instruments, Inc., Dallas. Central Research Labs.
**INTELLIGENT TUTORING FOR PROGRAMMING TASKS: USING PLAN ANALYSIS TO GENERATE BETTER HINTS Final Report, 30 Sep. 1980 - 31 Dec. 1981**
James R. Miller, Thomas P. Kehler, Paul R. Michaelis, and William R. Murray Mar. 1982 117 p refs
(Contract N00014-80-C-0828; NR Proj. 154-458)
(AD-A114020; TI-08-82-010; ONR-TR-0818F) Avail: NTIS HC A06/MF A01 CSCL 05/9

This project has dealt with tutorial systems for computer programming languages, particularly, systems in which a student is trying to write a computer program and can, upon request, receive hints about errors in his program and ways he can correct these errors. This research had two phases: an experimental investigation of the interaction between a student and a hint-giving tutor, and the construction of a tutorial system that identifies the plan underlying a student's program and gives hints that address errors in this plan. In the experimental work, an existing programming language tutor (BIP) was modified to allow students to request and receive hints from a human tutor. These experiments suggested that: (1) Programs are typically written in two stages: layout of the basic design of the program and (2) correction of the statements that instantiate this design. Systems that rely on 'canned' hints do not provide adequate assistance for the complex problems faced by students. Although BIP was able to give reasonable help on the syntactic form of language statements, it has no facilities for identifying and offering advice on problems with a program's design; in these experiments, students recognized this shortcoming and relied upon assistance from the human tutors. GRA

**N82-27984#** Vanderbilt Univ., Nashville, Tenn. Dept. of Psychology.
**THE CONSTANCY OF STEREOSCOPIC DEPTH PERCEPTION**
Robert H. Cormack 12 Jan. 1982 39 p refs
(Contract N00014-81-C-0001)
(AD-A111484) Avail: NTIS HC A03/MF A01 CSCL 05/10

Depth constancy is said to occur when the apparent depth in a scene remains the same as viewing distance changes. Studies of depth constancy have left unanswered questions regarding the range of viewing distances over which depth constancy can operate and the role of retinal disparity in preserving apparently constant depth. In this study, stereoscopic after images were exploited to confront these questions. After images containing depth information in the form of retinal disparity were produced and viewed at various fixation distances. Apparent depth in the afterimage was measured by asking observers to set a depth probe equidistant to the after image. This technique permitted holding retinal disparity constant as viewing distance changed. It allowed testing at very large viewing distances in the presence of multiple depth cues. The results indicate that stereoscopic depth constancy can be preserved at viewing distances at least as great as 27 meters (the largest used). These changes were veridical and demonstrate that the relationship between perceived depth and retinal disparity is consistent with the geometry describing stereopsis. These findings set requirements for theories of depth constancy. Specifically, they demand that such theories show how retinal disparity can be correctly recalibrated on the basis of distance information available in the visual array. Author (GRA)

**N82-27985#** Forschungsinstitut fuer Anthropotechnik, Bonn (West Germany).
**DESIGN AND VALIDATION OF A TRACKING TEST FOR FORMING MATCHED GROUPS FOR CONTINUOUS TRACKING EXPERIMENTS**
F. D. Pitrella and W. Krueger Aug. 1981 29 p refs In ENGLISH; GERMANY summary
(FB-49) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10

A tracking performance test was developed and used in forming matched groups. The need for such a matching test and the advantages of matched groups over randomized groups of subjects in experimental designs are discussed as well as the preference for between-subjects over within-subjects designs. Matching test reliability was measured (0.99) and predictive and matching validities were determined in a validation experiment. Validation coefficients of 0.79 were obtained which are considerably higher than necessary to prefer matched groups to randomized groups. The strategy used in developing this matching test is explained and may be useful to those who wish to develop their own matching tests for specific research purposes. Author (ESA)

**N82-27986*#** United Technologies Corp., East Hartford, Conn.
**STUDY OF EVA OPERATIONS ASSOCIATED WITH SATELLITE SERVICES Final Report, Aug. 1981 - Jan. 1982**
Jack O. Nash and Richard D. Wilde Apr. 1982 176 p refs
(Contract NAS9-16120)
(NASA-CR-167614; NAS 1.26:167614) Avail: NTIS HC A09/MF A01 CSCL 05H

Extravehicular mobility unit (EMU) factors associated with satellite servicing activities are identified and the EMU improvements necessary to enhance satellite servicing operations are outlined. Areas of EMU capabilities, equipment and structural interfaces, time lines, EMU modifications for satellite servicing, environmental hazards, and crew training are vital to manned

Eva/satellite services and as such are detailed. Evaluation of EMU capabilities indicates that the EMU can be used in performing near term, basic satellite servicing tasks; however, satellite servicing is greatly enhanced by incorporating key modifications into the EMU. The servicing missions involved in contamination sensitive payload repair are illustrated. EVA procedures and equipment can be standardized, reducing both crew training time and in orbit operations time. By standardizing and coordinating procedures, mission cumulative time lines fall well within the EMU capability. S.L.

**N82-27987*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**THE HUMAN ROLE IN SPACE**
Stephen B. Hall, George vonTiesenhausen, and Gary W. Johnson Apr. 1982 37 p refs
(NASA-TM-82482; NAS 1.15:82482) Avail: NTIS
HC A03/MF A01 CSCL 05H

Requirements for the future human role in space are considered. Human tasks were divided into normal scheduled activities, unscheduled activities, and contingency activities. A strawman mission model was developed. Projections were made of crew size, mission duration, pressurized spacecraft volume, and power requirements. Trends of human roles were likewise projected. N.W.

**N82-27988*#** Purdue Univ., Lafayette, Ind. Dept. of Food, Nutrition and Horticulture.
**PLANT DIVERSITY TO SUPPORT HUMANS IN A CELSS GROUND-BASED DEMONSTRATOR**
J. M. Howe and J. E. Hoff Jun. 1982 51 p refs
(Grant NsG-2401)
(NASA-CR-166357; NAS 1.26:166357) Avail: NTIS
HC A04/MF A01 CSCL 05H

Factors that influence the human nutritional requirements envisioned in a controlled ecological life support system ground-based demonstrator and on bioavailability experiments of Ca, Fe and Zn are discussed. The interrelationhip of protein and magnesium on Ca retention is also described. Author

**N82-27989#** Army Natick Development Center, Mass. Individual Protection Lab.
**DEVELOPMENT OF A MICROCLIMATE COOLING SYSTEM FOR COMBAT VEHICLES**
Vincent D. Iacona, Joseph S. Cohen, Michael Kupcinskas, Diego Gorbea, and Joseph Fratantuono Feb. 1982 33 p refs
(DA Proj. 1G2-63747-D-669)
(AD-A112017; NATICK/TR-82/010; IPL-248) Avail: NTIS
HC A03/MF A01 CSCL 06/17

This report describes a study conducted at Yuma Proving Ground, Arizona. Trained acclimated soldiers conducted simulated combat missions in a stationary M-1 tank, while wearing Chemical Biological (CB) clothing. Physiological measurements, skin temperature, rectal temperature, heart beat rate and sweat production were continuously monitored. In addition, the environmental parameters of wet bulb, dry bulb, and wet bulb globe temperature and wind velocity and relative humidity were recorded. GRA

**N82-27990#** Hughes Aircraft Co., El Segundo, Calif. Radar Systems Group.
**HOLOGRAPHIC LASER VISOR MOCK-UP Final Report**
M. J. Chern, T. L. Dobbs, and G. E. Moss Jun. 1981 66 p
(Contract N62269-79-C-0288)
(AD-A112422; HAC-REF-E6018) Avail: NTIS
HC A04/MF A01 CSCL 06/17

The goal of this program was to show that a holographic reflector added to a pilot's visor can provide laser eye protection which has advantages over that which can be provided by other means such as the addition to an absorbing dye. GRA

**N82-27991#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**REFERENCE BOOK FOR THE NITROGEN INDUSTRY WORKER, VOLUME 2**
M. A. Minovich, Ye. Ya. Melnikov, V. A. Klevke, S. D. Fridmen, B. P. Melnikov, V. F. Sokolova, M. I. Kopyev, V. A. Ulina, T. N. Sharonova, I. D. Nefedova et al 19 Mar. 1982 647 p refs
Transl. into ENGLISH of Spravochnik Azotchika (USSR), v. 2, 1969 p 1-445
(AD-A113749; FTD-ID(RS)T-1465-80) Avail: NTIS
HC A99/MF A01 CSCL 07/10

Materials and equipment used in the production of nitric and of nitrogen fertilizers are discussed. The physical chemical properties of ammonium nitrate, calcium nitrate, potassium nitrate, sodium nitrate, sodium nitrite, ammonium sulfate, and carbamide are examined as well as of ammonia water, ammoniates, and liquid complex fertilizers. Attention is given to the metals and alloys, and corrosion resistant and thermal insulating materials. Compressors, pumps, and high pressure vessels are treated. Heat and electrical engineering in the plant are considered. Basic information on accident prevention in the nitrogen industry is provided in the form of tables. A.R.H.

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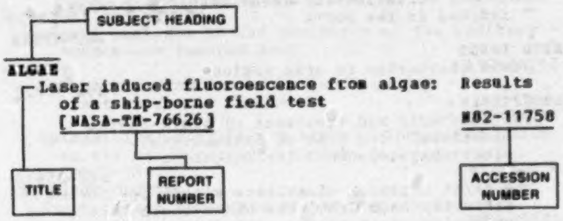

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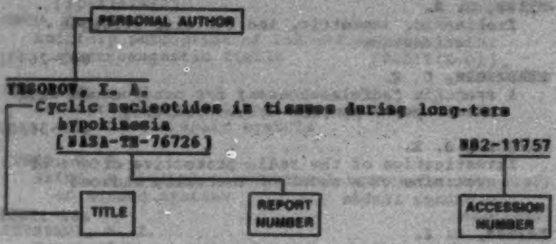

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NASA SP-7011(238)

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 238)

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in October 1982 in**

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This Supplement to *Aerospace Medicine and Biology* lists 583 reports, articles and other documents announced during October 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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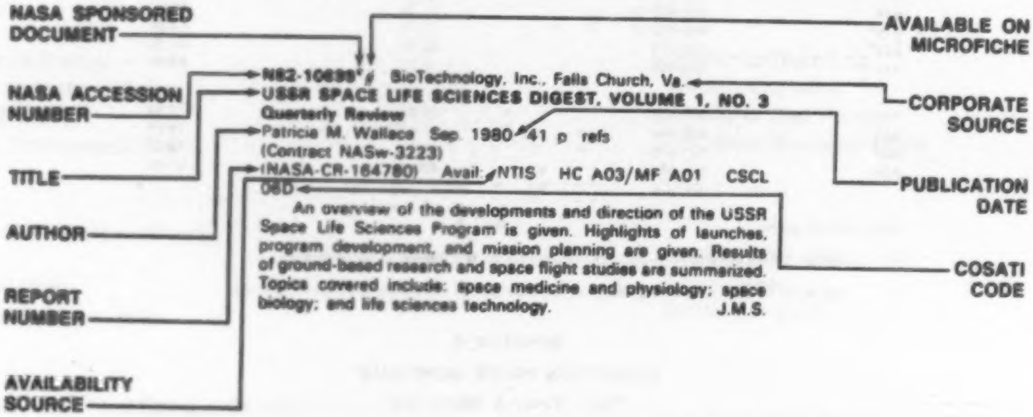

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**N82-10699*#** BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3 Quarterly Review**
Patricia M. Wallace Sep. 1980 41 p refs
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(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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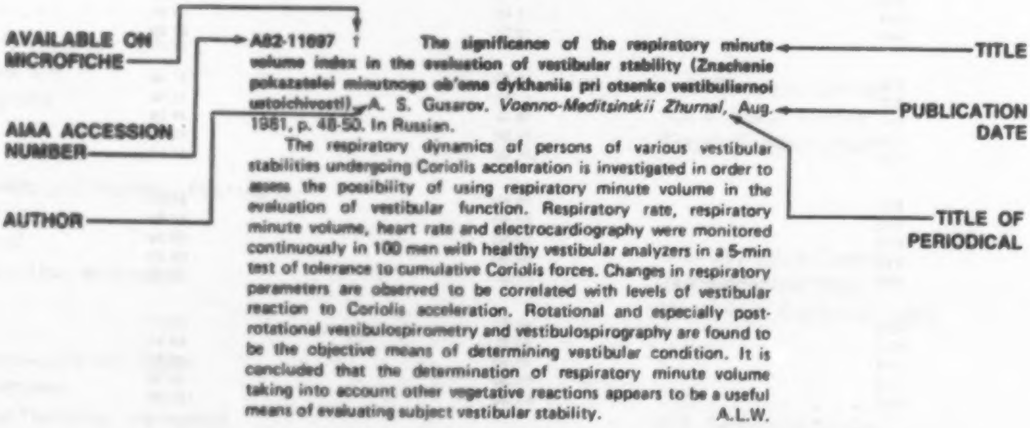

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**A82-11697** # **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti)**. A. S. Gusarov. *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY *A Continuing Bibliography (Suppl. 238)*

NOVEMBER 1982

## IAA ENTRIES

**A82-38115** **Clay and the origin of life.** C. Ponnamperuma, A. Shimoyama, and E. Friebele (Maryland, University, College Park, MD). *Origins of Life*, vol. 12, Mar. 1982, p. 9-40. 118 refs.

The possible roles of clay minerals in chemical evolution on the primitive earth are reviewed on the basis of available experimental evidence. Experiments involving the synthesis of biomonomers, including amino acids, purines, pyrimidines and carbohydrates, from gas mixtures in the presence of various clay minerals have shown the minerals to act by promoting the synthesis reactions without changing the direction of the reaction path, thus decreasing the time required for significant quantities of these molecules to accumulate. The capacity of clay minerals to adsorb and concentrate by several orders of magnitude these biomonomers from aqueous solution has also been demonstrated, with conditions for the adsorption process most favorable at low pH, and with basic molecules. Finally, it has been shown that clays may act to promote the polymerization of biological monomers by concentrating them, providing containment and a surface for immobilization, and protecting the reaction products, rather than by catalysis or direct participation in the reaction. A.L.W.

**A82-38116** **Formation of cyanate and carbamyl phosphate by electric discharges of model primitive gas.** Y. Yamagata and T. Mohri (Kanazawa University, Kanazawa, Japan). *Origins of Life*, vol. 12, Mar. 1982, p. 41-44. 8 refs.

The formation of cyanate and carbamyl phosphate, possible condensing agents in early chemical evolution, as a result of electrical discharges in a model of the primitive atmosphere consisting of a mixture of nitrogen, carbon dioxide and hydrogen is reported. Experiments were performed in a 5-l discharge vessel containing 100 ml of 0.2 M NaHCO3 solution, 10 cm Hg nitrogen, 20 cm Hg carbon dioxide and from 5 to 30 cm Hg hydrogen. Determinations of cyanate formation according to the 690 nm absorption of the copper pyridine cyanate complex indicate maximum cyanate formation efficiency to be achieved at a hydrogen partial pressure of 10 cm Hg, corresponding to a largely oxidized gas mixture. The use of a phosphate solution in the discharge vessel with the same gas mixture is found to lead to the production of carbamyl phosphate, as indicated by the formation of ATP upon the incubation of the discharged solution with ADP and carbamyl phosphokinase. A.L.W.

**A82-38117** **Uracil synthesis via HCN oligomerization.** A. B. Voet and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Origins of Life*, vol. 12, Mar. 1982, p. 45-49. 27 refs.

The identification of uracil among the products of the acid hydrolysis of HCN oligomers is reported. Oligomers were prepared from 1 and 0.1 M HCN solutions allowed to stand at room temperature for at least 6 months, then hydrolyzed in 6 M HCl at 110 C for 18 hours. Uracil was identified by high-pressure liquid chromatography following, although not prior to, acid hydrolysis, at concentrations corresponding to yields of 0.001% for the 1-M solution, and 0.005% for the 0.1-M solution. Experiments with oligomer hydrolysis in the presence of orotic acid have shown the uracil detected not to be a product of orotic acid decarboxylation, but to originate from at least two other precursor fractions. The results represent the first report of the production of a genetic code pyrimidine by HCN oligomerization. A.L.W.

**A82-38118 *** **The radiolysis and racemization of leucine on proton irradiation.** W. A. Bonner (Stanford University, Stanford, CA), R. M. Lemmon, and H. E. Conzett (California, University, Lawrence Berkeley Laboratory, Berkeley, CA). *Origins of Life*, vol. 12, Mar. 1982, p. 51-54. 19 refs. Contract No. W-7405-eng-48; Grant No. NGL-05-020-582.

D- and L-Leucine have been subjected to 39-55 percent radiolysis using 0.11 MeV protons, both with the proton beam passing through the sample or being absorbed by it and with quenching the sample immediately on completion of irradiation or after a 21-day interval. Racemization was small (1.1-1.7 percent) and comparable in all cases, suggesting that radioracemization and secondary degradative effects were not important factors in the recent unsuccessful attempts to induce optical activity in DL-Leucine by partial radiolysis using 0-11 MeV longitudinally polarized protons. (Author)

**A82-38119** **Polynucleotide replication coupled to protein synthesis - A possible mechanism for the origin of life.** A. G. Mackinlay (New South Wales, University, Kensington, Australia). *Origins of Life*, vol. 12, Mar. 1982, p. 55-69. 22 refs.

A speculative scheme is proposed for the origin of protein synthesis by the incorporation of amino acid linking into the process of polynucleotide replication. The scheme supposes polynucleotide replication to be accomplished by the condensation of aminoacyl-blocked oligonucleotides concomitant with the transfer of the blocking amino acid to an adjacent aminoacyl oligonucleotide, resulting in the formation of a peptide chain of random sequence. The polynucleotides are proposed to have been composed of repeating units similar to modern tRNAs, with internal complementarity. Selection of primitive tRNAs in which the amino acid and anticodon stem sequences were rotationally symmetrical could then have led to specific, anticodon-directed aminoacylation and the fixation of the genetic code. The end result of this evolution would have been a nucleoprotein structure resembling the ribosome, which would have been able to give rise directly to triplet-coded protein synthesis. Recent RNA sequence data are consistent with the proposed scheme. A.L.W.

**A82-38120** **Ambiguity and the evolution of the genetic code.** R. R. Kocherlakota and N. D. Acland (Vincent Massey Collegiate Institute, Winnipeg, Manitoba, Canada). *Origins of Life*, vol. 12, Mar. 1982, p. 71-80. 25 refs.

A scenario for the evolution of the genetic code by a word length alteration is proposed that relies on code ambiguity to minimize the time required for code changes. The model posits a primeval code containing only two bases (G and C) arranged in two-letter codons. The first alteration in the code that would probably have occurred would then be an alphabet alteration, in which the replacement of some G and C bases by A and U bases at a time when the environmental rate of change was high and ambiguity was favored would have expanded the vocabulary. Due to the high ambiguity, however, the vocabulary will begin to decline, and another alteration, this time a word length alteration to a value of three, could occur. The proposed model predicts the distribution of 4-blocs and 2-blocs in the genetic code, and determines the probable sites for code variations. A.L.W.

**A82-38121 *** **Evolution of major metabolic innovations in the Precambrian.** J. Barnabas (Georgetown University Medical Center, Washington, DC; Ahmednagar College, Ahmednagar, India), R. M. Schwartz, and M. O. Dayhoff (Georgetown University Medical Center, Washington, DC). *Origins of Life*, vol. 12, Mar. 1982, p. 81-91. 91 refs. Grants No. NIH-GM-08710; Contract No. NASw-3317.

A combination of information on the metabolic capabilities of prokaryotes with a composite phylogenetic tree depicting an overview of prokaryote evolution based on the sequences of bacterial ferredoxin, 2Fe-2S ferredoxin, 5S ribosomal RNA, and c-type cytochromes shows three zones of major metabolic innovation in the Precambrian. The middle of these, which reflects the genesis of oxygen-releasing photosynthesis and aerobic respiration, links metabolic innovations of the anaerobic stem on the one hand and, on the other, proliferation of aerobic bacteria and the symbiotic associations leading to the eukaryotes. Those pathways where information on the structure of the enzymes is known are especially considered. Halobacterium and Thermoplasma (archaebacteria) do not belong to a totally independent line on the basis of the composite tree but branch from the eukaryote cytoplasmic line. (Author)

**A82-38122 *** **Chemical evolution and the origin of life - Bibliography Supplement 1980.** L. G. Pleasant (George Washington University Medical Center, Washington, DC) and C. Ponnamperuma (Maryland, University, College Park, MD). *Origins of Life*, vol. 12, Mar. 1982, p. 93-114. 484 refs. Grants No. NASW-3165; No. NGR-21-002-317.

**A82-38151 † Changes in electrically neutral Ca/2+/-H/+/ exchange in rat liver mitochondria following gamma irradiation (Izmenenie elektroneitral'nogo Ca/2+/-H/+/ obmena v mitokhondriiakh pecheni krys posle gamma-oblucheniia).** B. I. Medvedev, G. V. Gogvadze, and A. M. Kuzin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 291-295. 5 refs. In Russian.

**A82-38152 † Changes in the relations of pyrimidine blocks in DNA of the hematopoietic system immediately following gamma irradiation of the animal (Izmeneniia v sootnosheniiakh pirimidinovykh blokov DNK krovetvornoi sistemy neposredstvenno posle gamma-oblucheniia zhivotnogo).** A. A. Vetchinkina and G. A. Kritskii (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 296-300. 9 refs. In Russian.

**A82-38153 † Study of the relation between the number of sulfhydryl groups and the level of lipid antioxidant activity in the organs of individual animals of different species (Issledovanie sviazi mezhdu kolichestvom sul'fgidril'nykh grupp i urovnem antiokislitel'noi aktivnosti lipidov organov u individual'nykh zhivotnykh raznykh vidov).** E. B. Burlakova, G. F. Ivanenko, A. A. Konradov, V. M. Maksimov, and L. N. Shishkina (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 301-306. 20 refs. In Russian.

A study is presented of the possible relation between the two principal determinants of an organism's radiosensitivity - sulfhydryl groups and lipid antioxidant activity - in the sensitive organs of individual animals of different species. Determinations of thiol contents and lipid anitoxidant activity were made simultaneously in the spleens and livers of individual rates, mice, golden hamsters and guinea pigs. Mathematical analysis reveals no linear or uniform correlation between the two parameters either in individual animals, or in animals of different species. It is thus concluded that the levels of sulfhydryl groups and lipid anitoxidant activity represent different aspects of cellular metabolism, both of which play a significant role in determining radiation tolerance. A.L.W.

**A82-38154 † Optimization of the conditions of modified cell irradiation (Optimizatsiia rezhima modifitsirovannogo oblucheniia kletok).** E. K. Palamarchuk (Akademiia Nauk SSSR, Fizicheskii Institut, Moscow, USSR) and S. V. Semenov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fiziko-Tekhnicheskikh i Radiotekhnicheskikh Izmerenii, Mendeleevo, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 307-311. 6 refs. In Russian.

Results are presented of the optimization of a cell irradiation procedure on the basis of a dynamic mathematical model describing the effects of ionizing radiation on cells. Numerical integrations of model equations were performed on a BESM-6 computer to obtain the temporal characteristics of preliminary sensitizing and subsequent damaging radiation fluxes leading to the maximal death of cells of different initial radiosensitivities for a given damaging radiation dose. Model parameters were taken from experimental data obtained in HeLa tumor cell cultures. The possibility of enhancing the damaging effects of the main dose by repeated preliminary sensitization is considered, and the potential for the sensitization of only one type of cell in a population with heterogeneous radiosensitivities is noted. A.L.W

**A82-38155 † Radiation-induced shortening of the life span of D. melanogaster. II - Sensitizing effects of 5-bromo-2-deoxyuridine (Radiatsionno-indutsirovannoe ukorochenie prodolzhitel'nosti zhizni D. melanogaster. II - Sensibiliziruiushchee deistvie 5-brom-2-dezoksiuridina).** A. I. Potapenko, A. P. Akif'ev, and V. I. Ivanov (Moskovskii Inzhenerno-Fizicheskii Institut; Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 318-322. 12 refs. In Russian.

**A82-38156 † Radiation damage and recovery of mouse T-cells. IV - Elimination of radiation-induced migration abnormalities in T-lymphocytes (Radiatsionnoe porazhenie i vosstanovlenie T-kletok myshei. IV - Likvidatsiia migratsionnykh defektov T-limfotsitov, indutsirovannykh oblucheniem).** A. A. Iarilin, Iu. N. Anokhin, and E. F. Polushkina (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 341-345. 15 refs. In Russian.

**A82-38157 † Effects of cAMP accumulation activators on certain stages of genome expression in cells upon acute radiation damage to the organism. III - Comparative study of the properties of RNA synthesized in a system of isolated liver and spleen cell nuclei from irradiated rats and animals having been treated with serotonin prior to irradiation (Vliianie aktivatorov nakopleniia tsAMF na otdel'nye etapy ekspressii genoma v kletkakh pri ostrom luchevom porazhenii organizma. III - Sravnitel'noe izluchenie svoistv RNK, sintezirovannoi v sisteme izolirovannykh iader kletok pecheni i selezenki obluchennykh krys i zhivotnykh kotorym pered oblucheniem vvodili serotonin).** B. A. Tsudzevich, L. A. Galkina, and N. E. Kucherenko (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 379-382. 10 refs. In Russian.

**A82-38158 † State of the lactate dehydrogenase reaction in the muscular tissue of irradiated animals (Sostoianie laktatdegidrogenaznoi reaktsii v myshechnoi tkani obluchennykh zhivotnykh).** I. V. Savitskii and A. A. Mardashko (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 390-392. In Russian.

The state of the reaction catalyzed by lactate dehydrogenase is studied as an indicator of oxidative metabolism in the muscles of irradiated animals. Lactate dehydrogenase activity, isoenzyme levels and lactate and pyruvate levels were determined in muscle taken from rats having undergone whole-body X radiation at a dose of 5.82 gram roentgen. A decrease in enzyme activity is found in cardiac muscle on the third day following irradiation, followed by an increase to a peak on the 15th day, while skeletal muscle showed a steady increase in activity to the seventh day. The activity of the second lactate dehydrogenase activity is observed to increase steadily in cardiac muscle, while in skeletal muscle the activity of the dominant fifth isoenzyme dropped after 1-3 days, then increased significantly by the seventh day. A slight increase in the lactate/pyruvate ratio is observed in both tissues. It is thus concluded that the processes of aerobic metabolism are not affected by penetrating radiation in the early stages, and that the role of anaerobic reactions increases only at the height of radiation sickness. A.L.W.

**A82-38159 † Study of the radioprotective effectiveness of an hypoxic gas mixture during combined radiation and thermal injuries to rats (Izluchenie radiozashchitnoi effektivnosti gazovoi gipoksicheskoi smesi pri kombinirovannom radiatsionno-termicheskom porazhenii krys).** R. B. Strelkov, N. G. Kucherenko, M. V. Radzhapova, V. D. Baranov, A. I. Drozd, and A. I. Britun (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 392-395. 11 refs. In Russian.

The possibility of using a breathing gas mixture containing 10% oxygen, which has been found effective in protecting against the harmful effects of ionizing radiation, to reduce the effects of combined radiation and thermal exposure is investigated. Rats were irradiated at total doses of 7.0, 8.5 and 10.0 gram roentgen while breathing either the hypoxic gas mixture or room air, then subjected to third-degree thermal trauma over 15% of their body surface. Hypoxia is observed to decrease the moribidity after 30 days of rats irradiated at all doses, with a dose reduction factor of 1.25, corresponding to the magnitude of that observed in rats subjected to radiation alone. Morbidity is higher, however, and mean lifetimes shorter, in rats exposed to both heat and radiation than in those undergoing radiation alone, even when both groups are subject to the hypoxic gas mixture during treatment. A.L.W.

**A82-38160 † Equivalent doses, dose rates and times of chronic exposure to ionizing radiation for various mammals (Ekvivalentnye dozy, moshchnosti dozy i vremena khronicheskogo oblucheniia ioniziruiushchei radiatsiei dlia razlichnykh mlekopitaiushchikh).** V. G. Tiazhelova (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Radiobiologiia*, vol. 22, May-June 1982, p. 420-423. 9 refs. In Russian.

A survey of data reported in the literature shows that three distinct stages of clinical, biochemical and morphological changes are manifested in mammals after chronic exposure to varying nonlethal doses of ionizing radiation. Listed in a detailed table are the characteristics for each of these three stages, such as changes in the electrocardiogram, blood, and endocrine system. The doses, dose rates and times of chronic exposure necessary to produce equivalent physiological effects characterized by each of the three stages are determined for humans, dogs and mice. N.B.

**A82-38161 † Changes in the hemodynamics and efferent activity in the renal nerve with acute hypoxic hypoxia under the stabilization of perfusion pressure in carotid sinuses (Izmeneniia gemodinamiki i efferentnoi aktivnosti v pochechnom nerve pri ostroi gipoksicheskoi gipoksii v usloviiakh stabilizatsii perfuzionnogo davleniia v karotidnykh sinusakh).** O. V. Baziliuk (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 285-289. 9 refs. In Russian.

**A82-38162 † Baroreflex regulation of hemodynamics under orthostatic effects /an investigation with a mathematical model/ (Baroreflektornaia reguliatsia gemodinamiki pri ortostaticheskikh vozdeistviiakh /issledovanie na matematicheskoi modeli/).** R. D. Grigorian (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 296-301. In Russian.

Mathematical modeling is used to investigate the role of the baroreflex from the reflexogenic zones of the carotid sinuses and aortic arch compensating for disturbances to the central hemodynamics during simulations of changes in body position. Here, the head moves upward and downward from the horizontal to angles of up to 90 deg. It is shown that in comparison with antiorthostatic compensation for an altered level of arterial pressure, compensation with orthostatism is effected with less baroreflex stress. By means of simulations on a model for the deafferentation of aortic and sinocarotid baroreflexes, it is shown that the method of deafferentation does not allow a quantitative evaluation of the relative regulatory roles of these processes. C.R.

**A82-38163 † The effect of repeated episodes of emotional stress on heart activity and the content of monoamines in the heart (Vliianie mnogokratno povtoriaemogo emotsional'nogo stressa na deiatel'nost' serdtsa i soderzhanie v nem monoaminov).** I. V. Raitses (Ivano-Frankovskii Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 302-305. 10 refs. In Russian.

It is experimentally established that when rabbits are repeatedly subjected to emotional stress, changes occur in heart rhythm, with bradycardia alternating with tachycardia. In addition, the electrical activity of the heart is lowered, and ventricular extrasystoles are observed. The arrhythmia is found to be accompanied by an increase in the amount of noradrenaline and its precursors and of serotonin in the myocardium. C.R.

**A82-38164 † Features of microcirculatory hemostasis and of the clotting and fibrinolytic properties of blood and the activity of the antioxidant system in people of various ABO blood groups (Osobennosti mikrotsirkuliatornogo gemostaza, gemokoaguliruiushchikh i fibrino liticheskikh svoistv krovi i aktivnost' aktioksidantnoi sistemy u liudei razlichnykh grupp krovi sistemy AVO).** G. A. Loban' (Poltavskii Meditsinskii Stomatologicheskii Institut, Poltava, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 317-321. 18 refs. In Russian.

**A82-38165 † The effect of helium on gas exchange and tissue respiration (Vliianie geliia na gazoobmen i tkanevoe dykhanie).** V. A. Berezovskii, A. I. Nazarenko, and T. N. Govorukha (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 353-358. 31 refs. In Russian.

The various studies that have been carried out on the subject are surveyed. It is pointed out that many investigators believe that the effect of helium under normal pressure is more physical than pharmacological. On the basis of an analysis of these investigations, it is contended that helium is not neutral in relation to biological structure and that the effect of gases of the helium group on physiological processes is realized through a modification of the physical characteristics of the gaseous medium. It is also maintained that inert gases can exert a pharmacological effect by virtue of a change in cellular function brought about by interactions at the molecular level. C.R.

**A82-38166 † The characteristics of hemodynamic shifts under physical stress at mountain elevations (K kharakteristike gemodinamicheskikh sdvigov pri fizicheskoi nagruzke v usloviiakh vysokogor'ia).** L. G. Stepanenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, May-June 1982, p. 361-363. 8 refs. In Russian.

The changes that occur in central hemodynamic parameters in athletes at mountain elevations are investigated. The study is carried out on 13 oarsmen ranging in age from 18 to 26. The subjects are given a week to adapt to a temperature of 18 C and a relative humidity of 60% at elevations of 2200 m and 3500 m above sea level. The circulatory systems of the athletes are found to possess sufficient stability in relation to the lower content of oxygen in the blood, a consequence of the physical stresses to which they are subjected and the lower partial pressure of oxygen in the air. The changes in the central hemodynamic indicators at the two elevations are found to be adaptive, attesting the resistance of the athletes to the effects of hypoxia. C.R.

**A82-38167 † Causes of high-altitude acute pulmonary edema (O prichinakh vysotnogo ostrogo oteka legkikh).** E. M. Ismailov (Kirgizskii Meditsinskii Institut, Frunze, Kirgiz SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 21-25. 6 refs. In Russian.

Changes in functional systems and their possible participation in triggering mechanisms of high-altitude acute pulmonary edema were studied in experiments performed on male rabbits. The development of the high-altitude edema is discussed in relation to hypo- and hyper-proteinemia, hypo- and hyper-volemia, the blocking of alpha and beta adrenoreceptors, tropinization, glomectomy, increases in the central blood volume and pressure in pulmonary vessels, and increases in the permeability of these vessels. B.J.

**A82-38168 † Early reaction of the hemopoietic organs depending on the condition of the peripheral M-cholinergic systems (Ranniaia reaktsiia krovetvornykh organov na stress-vozdeistvie v zavisimosti ot sostoianiia perifericheskikh M-kholinoreaktivnykh sistem).** Iu. B. Deshevoi. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 25-27. 10 refs. In Russian.

Rats were subjected to six-hour immobilization during atropine block or aceclidine stimulation of the peripheral M-cholinergic receptors. It is shown that the injection of the agents produced no significant effect on the cellular reaction of the bone marrow and lymphoid organs to the stress. The injection of the agents did alter the character of the poststress lymphopenia and neutrophilia. It was found that atropine injection intensified while aceclidine injection reduced the degree of lymphopenia and neutrophilia. B.J.

**A82-38169 † The synthesis of nuclear and mitochondrial DNA and RNA, and the synthesis of heme and globin in rabbit bone marrow during the stimulation of erythropoiesis (Sintez iadernykh i mitokhondrial'nykh DNK i RNK, sintez gema i globina v kostnom mozge krolikov pri stimuliatsii eritropoeza).** Iu. D. Goncharenko and A. D. Pavlov (Riazanskii Meditsinskii Institut, Ryazan, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 36-39. 16 refs. In Russian.

Biosynthesis in bone marrow cells for periods of 4 and 24 hours after hypoxia and bloodletting was studied in experiments on rabbits. Four hours after hypoxia, the serum erythropoietin level increased and the synthesis of nuclear and mitochondrial RNA in the bone marrow was augmented; nuclear DNA synthesis increased by the 24th hour. It is found that erythropoietin produces a primary activating effect on the differentiation of erythropoietin-responsive cells and a secondary effect on the proliferation of erythropoietin-responsive cells and maturating erythroid cells. Changes in the synthesis of mitochondrial DNA, heme, and globin were found to occur in phases, which was apparently associated with the characteristics of bone marrow cell energy in the early and late periods of hypoxia. B.J.

**A82-38170 † The effect of hypokinesia on the resistance of the heart to hypoxia (O vliianii gipokinezii na rezistentnost' serdtsa k gipoksii).** E. A. Markova, V. M. Gandziuk, and I. L. Popovich (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 46-50. 19 refs. In Russian.

Experiments performed on white mice show that hypokinesia reduces the heart's resistance to acute hypoxia and changes the character of the effects of adrenaline and inderal on the heart's tolerance to hypoxia. These data are explained in terms of heterochronous disease in the synthesis of protein structures of the sarcolemma and myocardiocytic sarcoplasmic reticulum during hypokinesia. The cation pump capacity is reduced and a change occurs in the relation between the effect of adrenaline on two differently directed processes determining the efficacy of oxygen utilization by the mitochondria. B.J.

**A82-38171 † The effect of denervation and tendotomy on oxidative phosphorylation in skeletal muscles of the rabbit and the resistance of phosphorylation to uncoupling agents (Vliianie denervatsii i tendotomii na okislitel'noe fosforilirovanie v skeletnykh myshtsakh krolika i rezistentnost' fosforilirovaniia k razobshchaiushchim agentam).** M. A. Shvets (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 76-78. 10 refs. In Russian.

**A82-38177 † Experimental and clinical study of a new immunoregulatory preparation - thymalin (Eksperimental'noe i klinicheskoe izuchenie novogo immunoreguliruiushchego preparata - timalina).** V. Kh. Khavinson and V. G. Morozov. *Voenno-Meditsinskii Zhurnal*, May 1982, p. 37-39. In Russian.

Results are presented of studies of the preparation, pharmacological properties and clinical applications of thymalin, a substance with immunoregulatory properties. Thymalin was first isolated from the thymus of the calf in 1971, by a procedure involving acetone and acetic acid extraction to produce a polypeptide complex containing thymarin as its active agent. Injection of thymalin into thymectimized animals was found to facilitate the recovery of T-lymphocyte levels and the immune response to thymus-dependent antigens. In clinical studies on patients with various conditions connected with a disturbance of the immune system, the administration of thymalin has been shown to aid healing or improve the condition in a majority of cases, associated with increases in the activity and quantity of T-lymphocytes and the normalization of various metabolic processes with few side effects. Thymalin is therefore recommended for a wide range of medical purposes, including the improvement of human performance under conditions where the state of the immune system determines tolerance to unfavorable environments. A.L.W.

**A82-38178 † The effectiveness of perspiration in a hot environment (Ob effektivnosti potootdeleniia v usloviiakh zharkoi sredy).** F. T. Eronin and N. F. Koshelev. *Voenno-Meditsinskii Zhurnal*, May 1982, p. 42, 43. 8 refs. In Russian.

The relation of beverage consumption to the effectiveness of perspiration as a cooling mechanism in a hot environment is investigated. Measurements of perspiration, beverage consumption, sweat evaporation and heat loss were made in trained volunteers exercising in 34-34.5 C heat and drinking either water, a salt solution, or a vitamin solution. No significant differences were foun; in any of the measured parameters with the exception of beverage consumption, for which unpleasant tastes and appearances associated with the salt and vitamin drinks are credited with reducing the amounts consumed. It is noted, however, that most of the sweat produced, amounting to as much as 1000 g/h, was evaporated from the skin or clothing, and was thus effective in body cooling. A.L.W.

**A82-38179 † Evaluation of vestibular function in flight personnel with chronic diseases during stable remission (K otsenke vestibuliarnoi funktsii u letnogo sostava s khronicheskimi zabolevaniiami v period stoikoi remis-**

**ali).** E. V. Lapaev, O. A. Nakapkin, and O. A. Vorob'ev. *Voenno-Meditsinskii Zhurnal*, May 1982, p. 44-46. 11 refs. In Russian.

The status of vestibular nystagmus and vestibulosensory reactions in persons with several chronic diseases not impeding flying activities is investigated. Tests of vestibular-autonomic tolerance to intermittent Coriolis acceleration, nystagmus upon undamped sinusoidal rotation, postrotational nystagmus, counter-rotation, cupulometry and caloric stimulation of the labyrinth were performed on flight personnel with various diseases while their respective diseases were in stable remission. Definite changes in vestibular function are observed for patients with several conditions not preventing flying, most notable those with diseases of the nervous system and cochlear neuritis. It is thus recommended that flight personnel with histories of such conditions be evaluated by combined studies of vestibulo-autonomic, nystagmic and sensory reactions. A.L.W.

**A82-38180 † Some characteristics of the diurnal rhythm of physiological functions of sailors in the tropics (Nekotorye osobennosti sutochnogo ritma funktsii organizma u moriakov v tropikakh).** V. V. Berdyshev and G. F. Grigorenko. *Voenno-Meditsinskii Zhurnal*, May 1982, p. 47, 48. In Russian.

The diurnal patterns of central nervous system, thermoregulatory, cardiovascular, respiratory adrenal cortical, vitamin C metabolic and mental and physical work capacity parameters were investigated in sailors during prolonged cruises in the tropics. Evaluations prior to sailing show the patterns of 20 healthy sailors to be essentially similar to those of groups in other climatic regions, with most indicators reaching their maximal values at 1200 and 1600 hours in the absence of a daytime nap, and a two-peak structure present when a nap is taken after the midday meal. In the initial period of the cruise, during the period of acute adaptation, the average levels of the various parameters are observed to be shifted, and diurnal rhythms exhibit a pronounced peak in the hot afternoon hours while the daily curve was flattened. Prolonged exposure to tropical conditions leads to changes in the activity of the various systems, including an overall improvement in cardiovascular functioning, a reduction in urinary 17-ketosteroid and vitamin C excretion, an increase in work capacity and vascular resistance, and a pronounced decrease in the markedness of the functional peak in the hot hours of the day. A.L.W.

**A82-38268 Circadian changes in resting heart rate and body temperature, maximal oxygen consumption and perceived exertion.** I. E. Faria and B. J. Drummond (California State University, Sacramento, CA). *Ergonomics*, vol. 25, May 1982, p. 381-386. 20 refs.

The effect of time of day on maximal oxygen uptake, heart rate, body temperature, and the rated perceived exertion (RPE) during exercise was studied over a 24 hr day-night cycle. Thirty-one subjects were randomly administered a treadmill test on 24 separate occassions, 48 hr apart, and the RPE determined at heart rates of 130, 150 and 170 beats/min. Oral temperature and heart rate exhibited parallel variance and were lower in the morning than afternoon or evening, while the maximal oxygen uptake was stable throughouy 24 hr. Heart rate and RPE varied nonlinearly, with the RPE being higher at 02.00 and 04.00 hr than at 20.00, 22.00 and 24.00. N.B.

**A82-38325 Rotating shift work schedules that disrupt sleep are improved by applying circadian principles.** C. A. Czeisler (Center for Design of Industrial Schedules, Boston; Harvard University, Cambridge, MA), M. C. Moore-Ede (Harvard University, Boston, MA), and R. M. Coleman (Stanford University, Stanford, CA). *Science*, vol. 217, July 30, 1982, p. 460-463. 33 refs.

The possibility of easing the transition of circadian rhythms to different schedules was examined in terms of swing shift worker schedules which were shifted by a phase delay process. A control group of employees, numbering 33, changed shifts once per week while the experimental group, with 52 subjects, followed a phase delay schedule with a complete shift change only once every 21 days. The program continued for 9 mos, after which the previous complaint rate concerning abrupt changes of shift dropped from 90 to 20% of the workers rotating shifts. Productivity, health, and turnover rates improved among the phase shift delay subjects, indicating that work shift schedules which rotate by phase delay with lengthy intervals between each rotation are more compatible with the human circadian rhythm system than are abrupt changes in schedules. M.S.K.

**A82-38534 † Selecting optimal conditions for heart conservation in weak aldehyde solutions by using mathematical methods of experimental design (Vybor optimal'nykh rezhimov konservirovaniia serdtsa slabymi rastvorami al'degidov s ispol'zovaniem matematicheskikh metodov planirovaniia eksperimenta).** V. I. Tel'pukhov, V. A. Shapelev, and A. N. Lisenkov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 106-109. 10 refs. In Russian.

Heart conservation experiments were carried out, in vitro and in vivo, on 200-300-g rats using weak aldehyde solutions, and a multiple-factor experiment was used to optimize the conditions of heart conservation. A regression model was obtained for the principal effects involved, and aldehyde concentrations for conservation in vitro and in vivo as well as the amount of aldehyde in ml per 100 g of animal weight were singled out as the most essential factors. The optimum values of these factors were then determined by using a two-level second-order experimental design; these values are: aldehyde concentrations of 0.037 and 0.03% for in vitro and in vivo heart conservation, respectively, with 0.65 ml of aldehyde used per 100 g of animal weight. V.L.

**A82-38535 † RNA-content distribution of cells from the normal and atherosclerctic human aorta (Raspredelenie po soderzhaniiu RNK kletok, vydelennykh iz normal'noi i vovlechennoi v ateroskleroz aorty cheloveka).** V. A. Kosykh, A. N. Orekhov, and V. S. Repin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 104-106. 7 refs. In Russian.

The distributions of RNA contents in cells from the intima and media of normal and atherosclerotic human aortas are investigated. Measurements of red fluorescence from acridine-orange-stained nucleic acids were made by a flow cytofluorimeter in cells isolated from 15 men aged 40 to 53 within 3 hours of death by means of enzymatic dispersion. Plots of the intensity of red fluorescence against light scattering, an indicator of cell size, reveal the presence of two subpopulations of cells in normal and atherosclerotic arteries. Cells of subpopulation A, with low RNA levels, are smaller than those in subpopulation B, with high RNA levels. Intimal cells from vessels with atherosclerotic lesions are observed to exhibit a greater proportion of subpopulation A cells than those from normal vessels, while the relative proportions of the two subpopulations in the medial cells remained the same. It is proposed that the cells of subpopulation A are less active than cells of subpopulation B. A.L.W.

**A82-38536 † Separation of bone marrow cells in mice by free-flow electrophoresis (Razdelenie kletok kostnogo mozga myshei metodom preparativnogo elektroforeza).** V. M. Kotel'nikov, V. P. Reshchikov, N. M. Fertukova, O. A. Gurevich, N. A. Rudneva, and G. I. Kozinets (Ministerstvo Zdravookhraneniia SSSR, Institut Gematologii i Pereliveniia Krovi, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 102-104. 12 refs. In Russian.

**A82-38537 † Study of RNA synthesis rate and DNA content in the myocardium of new-born rats during adaptation to high-altitude hypoxia (Izuchenie intensivnosti sinteza RNK i soderzhaniia DNK v miokarde novorozhdennykh krys v protsesse adaptatsii k vysotnoi gipoksii).** V. A. Kononova (Kirgizskii Nauchno-Issledovatel'skii Institut Akusherstva i Pediatrii, Frunze, Kirgiz SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 100-102. 12 refs. In Russian.

**A82-38538 † The dynamics of quantitative changes of RNA in rat cerebellum Purkinje cells in different functional states (Dinamika kolichestvennykh izmenenii RNK v kletkakh Purkin'e mozzhechka krys pri razlichnykh funktsional'nykh sostoianiiakh).** Z. A. Mikeladze (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR; Tbilisskii Gosudarstvennyi Universitet, Tbilisi, Georgian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 94-96. 12 refs. In Russian.

UV cytophotometry was used to study the time-dependent effect of vestibular stimulation on RNA content in the Purkinje cells of the rat cerebellum. The rats were placed in narrow boxes which were rotated horizontally (60 rpm) for an hour. In order to evaluate the effects of stress and hypoxia, the RNA content was examined in immobilized animals placed in the same boxes without rotation. Rhythmic quantitative changes in RNA content in the cytoplasm and nucleus of Purkinje cells were observed upon vestibular stimulation of the cerebellum function. In the nucleolus, changes in the RNA content were less pronounced. Periodic quantitative changes in the RNA content in the cytoplasm, nucleus, and nucleolus of Purkinje cells were statistically significant in the majority of the rats, but weakly pronounced. B.J.

**A82-38539 † The influence of the GABA-receptor blocker bicuculline on the effects of fenibut and diazepam (Vliianie blokatora GMAK-retseptorov bikukullina na effekty fenibuta i diazepama).** L. Kh. Allikmets, L. K. Riago, and A. M. Nurk (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 64, 65. 9 refs. In Russian.

Fenibut (100 mg/kg) was found to suppress motility and emotional reactivity but did not show any antiaggressive properties, whereas diazepam (2.5 mg/kg) increased motility and decreased agressiveness in rats. Bicuculline (1.25 mg/kg) by itself did not cause any behavioral changes, though it was capable of counteracting the effects of diazepam and potentiating those of fenibut. Bicuculline attenuated the rise in GABA but did not affect the increased content of HVA and DOPAC after administration of fenibut. B.J.

**A82-38540 † Enzymes that detoxify active forms of oxygen and lipoperoxide in experimental ischemia and myocardial infarction (Fermenty detoksikatsii aktivnykh form kisloroda i lipoperekisei pri eksperimental'noi ishemii i infarkte miokarda).** V. Z. Lankin, A. Kh. Kogan, A. L. Kovalevskaia, G. G. Konovalova, D. R. Rakita, A. N. Kudrin, and A. M. Vikhert

(Akademiia Meditsinskikh Nauk SSSR; I Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 58-60. 15 refs. In Russian.

The variation in the activity of superoxide dismutase, glutathione peroxidase, and glutathione-S-transferase was studied in experimental ischemia and myocardial infarction produced in rats. The activity of the first two enzymes mentioned decreased drastically two to fifteen minutes after ligation of the coronary artery and remained at a reduced level during the observation period (14 days). The activity of glutathione-S-transferase in the infarcted zone of the myocardium significantly decreased only by the third day of the experiment. The activity of glutathione perioxidase in the blood of patients with acute myocardial infarction rose more than 1.5-fold. B.J.

**A82-38541** † **Migration kinetics of hemopoietic stem cells in mice after severe mechanical trauma (Kinetika migratsii stvolovykh krovetvornykh kletok u myshei posle tiazheloi mekhanicheskoi travmy).** V. K. Kulagin and V. N. Aleksandrov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 45, 46. 7 refs. In Russian.

**A82-38542** † **Comparative study of systemic hemodynamics in normotensive and hypertensive rats (Sravnitel'naia otsenka sistemnoi gemodinamiki u normotenzivnykh i gipertenzivnykh krys).** Sh. I. Ismailov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and O. S. Medvedev (Andizhanskii Meditsinskii Institut, Andizhan, Uzbek SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 38-40. 9 refs. In Russian.

**A82-38543** † **The protective role of the forebrain with respect to pathological cardiac reflexes (O 'zashchitnoi' roli perednikh otdelov golovnogo mozga v otnoshenii patologicheskikh refleksov na serdtse).** G. E. Samonina (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 32-34. 16 refs. In Russian.

A study is presented of the relative importance of the facilitating and inhibitory influences of the hypothalamus on adaptive and pathological cardiac reflexes. The adaptive cardiocardiac reflex was elicited by the expansion of a small balloon in the right auricle and the pathological viscerocardiac reflex was elicited by the stretching of the urinary bladder in frogs undergoing electrical stimulation of the hypothalamus. Hypothalamic stimulation is found to either enhance or reduce the magnitude of the bradycardia produced by the viscerocardiac reflex and the tachycardia produced by the cardiocardiac reflex. Facilitation is observed in 27% of the cases of simultaneous and 31% of the cases of delayed reaction to the cardiac stimulus, but in only 23% of simultaneous and 12% of delayed reactions to the visceral stimulus. Reversal of the direction of the reflex was also observed. The greater inhibitory influence of the hypothalamus on the pathological reflex is thus seen as an instance of the physiologically beneficial control of lower nervous centers by higher ones. A.L.W.

**A82-38544** † **Local cerebral blood flow dynamics during experimental ischemia (Dinamika lokal'nogo mozgovogo krovotoka pri eksperimental'nom ishemicheskom insul'te).** L. N. Dorokhova, V. A. Sorokoumov, and V. A. Tsyrlin (I Leningradskii Meditsinskii Institut; Leningradskii Nauchno-Issledovatel'skii Institut Kardiologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 29-32. 6 refs. In Russian.

Changes in blood flow characteristics in various regions of the cerebral cortex during experimentally induced local ischemia are investigated. Experiments were performed on anesthetized cats undergoing ischemia produced by the occlusion of the middle cerebral artery. Recordings of local cerebral blood flow made by the hydrogen clearance method in 16 areas of the brain at various times after the ischemic insult show marked changes in the cerebral blood flow patterns, including enhancements and reductions in different areas, in both cerebral hemispheres. In addition, a disturbance in the mechanisms of cerebral blood flow regulation is noted in tests involving the artificial elevation of systemic blood pressure. A.L.W.

**A82-38545** † **Alterations in heart work rhythm during hyperactivation of the anterior amygdaline nucleus (Izmenenie ritma serdechnoi deiatel'nosti pri giperaktivatsii perednego amigdaliarnogo iadra).** G. N. Kryzhanovskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and Iu. I. Pivovarov (Irkutskii Meditsinskii Institut, Irkutsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 26-29. 16 refs. In Russian.

**A82-38546** † **The impulse activity of neurons in the nodose ganglion during acute hemodynamic and respiratory disorders (Impul'snaia aktivnost' neironov uzlovatogo gangliia pri ostrykh narusheniiakh gemodinamiki i dykhaniia).** G. I. Kositskii, S. D. Mikhailova, and T. M. Semushkina (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 24-26. 8 refs. In Russian.

**A82-38547** † **The role of central gray matter in the activation of antipain systems of the rat's brain under stress (Rol' tsentral'nogo serogo veshchestva v aktivatsii protivobolevykh sistem mozga krys pri stresse).** E. O. Bragin, G. F. Vasilenko, and R. A. Durinian (Tsentral'nyi Nauchno-Issledovatel'skii Institut Refleksoterapii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 22-24. 6 refs. In Russian.

Electrolytic lesions of central gray matter (CGM) were induced in rats. Analgesia produced by stress (foot shock) was found to be significantly reduced in the lesioned rats. The baseline pain threshold measured by the hot-plate method was significantly longer in CGM-lesioned rats. The baseline tail-flick latency was unaffected by the lesions. The role of CGM in the regulation of pain sensitivity in rats is considered. B.J.

**A82-38548** † **An improved apparatus for venous occlusion plethysmography (Usovershenstvovannaia ustanovka dlia venoznoi okkliuzionnoi pletizmografii).** L. F. Borisova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 17, 18. 7 refs. In Russian.

An apparatus for venous occlusion plethysmography has been designed which allows the simultaneous recording of changes in the volume of a limb segment, and the rate and logarithm of these changes as the venous occlusion is effected and removed. The apparatus is based on a plethysmograph using a mercury-rubber sensor mounted on the limb to detect changes in limb size according to variations in sensor resistance, which depends on its length. Following amplification, plethysmographic signals are transmitted to a three-channel recording device directly, to obtain the plethysmographic curve, and after passage through a signal differentiator (an operational amplifier) and a logarithmic signal amplifier, to obtain the time rate of change and the logarithm of the limb volume, respectively. The device may be useful in studies of peripheral circulation in healthy subjects and in persons with disturbances in peripheral circulation. A.L.W.

**A82-38549** † **Two phases of the inotropic effect of adrenaline - The calcium dependence (Dve fazy inotropnogo deistviia adrenalina Kal'tsievaia zavisimost').** L. V. Sorokin, O. P. Iurchenko, and T. M. Turpaev (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 15-17. 12 refs. In Russian.

The biphasic inotropic effect of adrenaline administered for a long time (30 minutes) was studied on a frog ventricular strip. The decrease in contraction amplitude became more pronounced as the intensity of Ca-ion introduction into myocardial cells was potentiated by the increased frequency of stimulation and calcium or adrenaline concentrations were increased. Mechanisms of the adrenaline-induced decrease in contraction amplitude are examined. B.J.

**A82-38550** † **The influence of the speed of blood flow in the carotid artery on the hematocrit of the blood being delivered to the brain (Vliianie skorosti krovotoka v sonnoi arterii na gematokrit krovi, raspredeliaemoi k golovnomu mozgu).** G. I. Mchedlishvili and M. N. Varazashvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 12-14. 8 refs. In Russian.

**A82-38551** † **The cholinergic nature of hypothalamo-cortical excitatory influence (Kholinergicheskaia priroda gipotalamo-korkovykh vozbuzhdaiushchikh vliianii).** S. N. Kozhechkin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 10-12. 13 refs. In Russian.

The excitatory effect of electrical stimulation of the ventrocaudal area of the lateral hypothalumus on optical-cortex neurons in rabbits was observed mainly in cells whose activity increased under the effect of acetylcholine applied microionophoretically. Atropine applied microionophoretically decreased or completely blocked the hypothalamic excitatory effect as well as that of acetylcholine. Atropine did not change the depressing effect of the rostral region of the lateral hypothalamus on the neural cortical activity. It is found that the hypothalamo-cortical excitatory relationships are M-cholinergic in nature. B.J.

**A82-38552** † **Evidence of an immune mechanism of enzyme-hemostasis regulation (Dokazatel'stvo immunnogo mekhanizma reguliatsii fermentov gemostaza).** N. N. Tsybikov and B. I. Kuznik (Chitinskii Meditsinskii Institut, Chita, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, May 1982, p. 8, 9. 5 refs. In Russian.

Direct evidence was discovered of the immune regulation of homeostasis in the blood coagulation system. Autoantibodies that inactivate the appropriate enzymes were isolated from the plasma gamma-fraction and serum of nonimmunized animals by affinity chromatography on the sorbents IIa- and Xa-sepharose. The obtained immunoglobins displayed antienzymatic activity in pure systems and revealed a cross reaction in HIT. B.J.

**A82-38553** † **The detection of premorbid states and cardiovascular diseases during medical examinations of seamen (Vyiavlenie predbolez-**

**nennykh sostoianii i boleznei serdechno-sosudistoi sistemy pri meditsinskom osvidetel'stvovanii plavsostava).** L. I. Aleinikova, A. N. Gobzhelianov, I. I. Saltykov, A. G. Putienko, and V. P. Krivunchenko (Basseinovaia Bol'nitsa na Vodnom Transporte, Odessa, Ukrainian SSR). *Sovetskoe Zdravookhranenie,* no. 5, 1982, p. 48-50. In Russian.

**A82-38554 † Diagnosis and organization of the therapy of patients with disorders of blood circulation in the brain (K voprosu diagnostiki i organizatsii lecheniia bol'nykh s narvsheniem mozgovogo krovoobrashcheniia).** V. A. Gusev, R. L. Kuvshinova, Z. A. Markova, V. R. Rubtsova, and A. V. Shishkina (Riazanskii Meditsinskii Institut, Riazan, USSR). *Zdravookhranenie Rossiiskoi Federatsii,* no. 5, 1982, p. 35, 36. In Russian.

**A82-38555 † A study of temporary absences from work arising from disorders of the circulatory system (Nekotorye voprosy izucheniia vremennoi netrudosposobnosti pri bolezniakh sistemy krovoobrashcheniia).** N. A. Frolova, G. S. Mazanov, A. N. Branskaia, V. L. Krasnenkov, and T. D. Kozlova. *Zdravookhranenie Rossiiskoi Federatsii,* no. 5, 1982, p. 30-33. In Russian.

The medical records of persons who missed work in a particular region because of illnesses of the circulatory system are reviewed. The timeliness and accuracy of the diagnosis in each case are studied, along with the reasons for the diagnosis. Hypertonic and ischemic disorders are found to be the most common. The incidence of the illnesses, as reflected in time lost from work, is found to be lower among workers on kolkhozes and sovkhozes than among workers in urban areas. Those absent from work for the longest periods tended to be younger women and older men. The importance of an early diagnosis and of hospitalization is stressed. C.R.

**A82-38556 † The effect of long-wave ultraviolet radiation on cyclophosphamide-induced levels of chromosome aberrations in the bone marrow cells of mice (Vliianie dlinnovolnovogo ul'trafioletovogo izlucheniia na indutsirovannuiu tsiklofosfamidom chastotu khromosomnykh aberratsii v kletkakh kostnogo mozga myshei).** V. S. Zhurkov, V. P. Il'in, and Iu. I. Prokopenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Tsitologiia i Genetika,* vol. 16, Mar.-Apr. 1982, p. 6-9. 14 refs. In Russian.

**A82-38557 † Morphological and functional factors contributing to a hypertonic heart (O nekotorykh morfofunktsional'nykh osnovakh formirovaniia 'gipertonicheskogo serdtsa').** V. A. Frolov and G. A. Drozdova (Universitet Druzhby Narodov, Moscow, USSR). *Arkhiv Patologii,* vol. 44, no. 5, 1982, p. 35-41. 8 refs. In Russian.

The changes in heart activity that occur at various stages of arterial hypertension are investigated from a morphological and functional viewpoint. Experiments are carried out on 239 chinchilla rabbits ranging in weight from 3.0 to 3.2 kg. Three stages are discerned in the development of a hypertonic heart. The first stage (from the first to the fourth week) is a preparatory stage leading to compensation; the effects of overexertion manifest themselves and compensatory and adaptive changes begin. The second stage, from the sixth to the 10th week, is the compensation stage. Here, the process is stabilized and adaptive changes are strikingly apparent in the cardiac muscle, in particular, hypertrophy of the myocardium. The third stage, from the 22nd to the 52nd week, is one of decompensation. Here, destructive processes develop in the myocardium, and the contractile ability of the myocardium begins to weaken. C.R.

**A82-38558 † Ultrastructural changes in the brains of rats subjected to acute emotional stress (Ul'trastrukturnye izmeneniia mozga krys, perenesshikh ostroe emotsional'noe perenapriazhenie).** N. N. Bogolepov, L. B. Verbitskaia, T. I. Belova, and K. V. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 82, no. 5, 1982, p. 51-54. 7 refs. In Russian.

Changes in neuronal and synaptic ultrastructure in the parietal region of the cerebral cortex, the reticular formation of the midbrain and the pons varilii following acute emotional stress are studied in rats undergoing 2 hours of immobilization. Electron microscopic examination immediately, 1 hour and 24 hours after the immobilization procedure reveals two types of ultrastructural changes. The first type, including peripheral chromatolysis of the nerve cells and cytoplasmic changes including mitochondrial swelling, vacuolization and changes in the smooth endoplasmic reticulum, are of a functional, transitory character, being significantly reduced 24 hours after immobilization. The second type, on the other hand, are of a more pronounced and resistant nature, including vacuolization of the neuronal nuclei and marked changes in the synapses, and persist for at least 24 hours. It is suggested that these changes may represent the morphological basis for cerebrovisceral disorders developing after immobilization stress. A.L.W.

**A82-38559 † The thermal pulsation method in the study of several physiological mechanisms of the brain stem (Metod teplovoi pul'satsii v issledovanii nekotorykh fiziologicheskikh mekhanizmov mozgovogo stvola).** V. A. Likhtenshtein (Dagestanskii Meditsinskii Institut, Makhachkala, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 82, no. 5, 1982, p. 44-50. 14 refs. In Russian.

Results of physiological studies made using the application of thermal pulses to the body surface in the nasolabile region are discussed. Thermal pulsations have been observed to induce sleep, and thereby ameliorate neurotic and neurotic-like conditions. The somnogenic power of thermal pulsations has been noted to be enhanced when the pulsations are synchronized with respiration, a fact explained by the physiological thermopulsations normally experienced by the nasal thermoreceptors during the course of the respiratory cycle. A hypotensive effect of clinical significance has also been noted during thermal pulsation, which is attributed to local vascular dilation, along with an increase in peripheral blood flow. Results thus demonstrate the close relationship of thermoregulation with the mechanisms of sleep regulation, respiratory functions and the regulation of blood flow. A.L.W.

**A82-38560 † The concentration of adenyl nucleotides and creatine phosphate in the cerebral hemispheres during different manifestations of stress (Soderzhanie adenilovykh nukleotidov i kreatinfosfata v polushariiakh golovnogo mozga pri razlichnykh proiavleniiakh stressa).** V. V. Davydov, V. P. Tverdokhlib, and V. S. Iakushev (Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova* vol. 82, no. 5, 1982, p. 31-34. 16 refs. In Russian.

Changes in cerebral high-energy phosphate metabolism occurring during various manifestations of stress are investigated using as a model the development of cardiac necrosis in previously stressed rats. A marked increase in creatine phosphate levels is found in rats subjected to both emotional-nociceptive stress and cardiac necrosis with respect to intact animals and those subjected to stress alone, while creatine levels fell sharply. Whereas ATP levels remained constant as a result of stress, cardiac necrosis led to a steady decrease in ATP levels, accompanied by an increase in the levels of its decompostion products. Results indicate the importance of creatine and creatine phosphate in maintaining cerebral ATP levels, and suggest a possible pathogenetic mechanism for neurotic-like conditions observed in many visceral ailments. A.L.W.

**A82-38561 † Prostoglandins and regulation of cerebral circulation under conditions of the altered gaseous composition of the blood (Prostaglandiny i reguliatsiia mozgovogo krovoobrashcheniia pri izmeneniiakh gazovogo sostava krovi).** E. S. Gabrielian and E. A. Amroian. *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 5, 1982, p. 38-45. 13 refs. In Russian.

**A82-38562 † An attempt at the classification of 'patient pharmacokinetic capacities' (Popytka tipizatsii 'farmakokineticheskikh sposobnostei bol'nykh').** L. B. Nurmand and L. S. Mekhilane (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Farmakologiia i Toksikologiia,* vol. 45, May-June 1982, p. 79-82. 14 refs. In Russian.

The individual pharmacokinetic capacities of a group of patients are studied on the basis of the rates for the biotransformation of a single drug. Levels of the barbiturate barbamyl (Amobarbital) in the blood were determined at hourly intervals for 6 hours following ingestion on an empty stomach in 42 female patients with schizophrenia, seven with chronic alcoholism and three healthy women. Calculations of the absorption constant, distribution coefficient, residence half-life, total clearance and elimination constant of the substance on the basis of the concentration data allow the classification of the patients into three pharmacokinetic types: average, slow and rapid. The pharmacokinetic types are found to be related to patient age, the duration of drug therapy, and especially the efficacy of drug treatment, indicating the usefulness of pharmacokinetic capacities in the prediction of the effectiveness of pharmacotherapy. A.L.W.

**A82-38563 † The effect of potassium orotate on the metabolism of certain vitamins in patients with fractures of the long tubular bones (Vliianie kaliia orotata na obmen riada vitaminov v organizme bol'nykh s perelomami dlinnykh trubchatykh kostei).** R. S. Kuzdenbaeva, U. Sh. Shaikhiev, B. A. Utegenov, and S. A. Rystina (Aktiubinskii Meditsinskii Institut, Aktiubinsk, USSR). *Farmakologiia i Toksikologiia,* vol. 45, May-June 1982, p. 76, 77. In Russian.

**A82-38564 † Sword and scalpel (Mech i skal'pel').** A. Kholmskaia. *Khimiia i Zhizn',* May 1982, p. 36-39. In Russian.

A description is given of a laser knife developed in the Soviet Union known as Scalpel-1, an optical quantum generator using CO2. The knife is designed for use in operations on the stomach and intestines. In discussing the advantages of lasers in medicine, it is pointed out that they eliminate bleeding during operations. An account is also given of the way in which lasers can be used in skin transplants. They can also be used in cosmetic procedures, such as removing tattoos. C.R.

**A82-38565 † Use of the thermovision method in the prophylactic examination of polar workers (Ispol'zovanie teplovizionnogo metoda pri**

**provedenii profilakticheskikh osmotrov rabochikh Zapoliar'ia).** A. V. Ivanov, B. A. Skripal', V. F. Taroev, and G. P. Gagarin (Ministerstvo Zdravookhraneniia RSFSR, Nauchno-issledovatel'skaia Laboratoriia Kompleksnykh Problem Gigieny Truda s Klinikoi Professional'nykh Zabolevanii, Kirovsk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, May 1982, p. 56, 57. In Russian.

The potential of thermography for the early detection of neurovascular and osteoarticular disorders in the massive prophylactic examination of workers is evaluated in workers of the arctic metal-working industry. Thermograms of the hands and the wrist, elbow and shoulder joints were recorded photographically in 106 workers concurrently undergoing clinical and physiological studies. About 30% of the workers exhibited asymmetries in skin thermotopography and a reduction in thermal emission from the distal portions of the phalanges, which were often but not always accompanied by complaints of numbness and elevated sensitivity to cold. Similar disorders were found in fitters and molders, indicating the changes in skin thermotopography to be a result of the cold microclimate rather than vibration. Asymmetries in thermal emission from the large joints were observed in about 57% of the molders, corresponding to previously detected or unnoticed osteoarticular pathologies. Results thus support the use of thermography for the early detection of disorders induced by the combined effects of factors in the work environment. A.L.W.

**A82-38567** † **Physiological and hygienic analysis of the response of young truck drivers to their work load (Fiziologo-gigienicheskii analiz reaktsii organizma molodykh voditelei gruzovogo avtotransporta na proizvodstvennuiu nagruzku).** A. I. Klimenko, V. Ia. Umanskii, Iu. E. Liakh, and L. L. Pshedromirskii (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia*, May 1982, p. 24-27. 9 refs. In Russian.

**A82-38568** † **The effect of certain characteristics of work motions on the tolerance of hand muscles to static exertions (Vliianie nekotorykh kharakteristic rabochikh dvizhenii na vynoslivost' myshts ruk k staticheskomu usiliiu).** N. A. Kokhanova, E. F. Shardakova, V. V. Elizarova, and F. A. Kolosova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, May 1982, p. 15-18. 10 refs. In Russian.

**A82-38569** † **The conditions attending muscular strain in work involving only a few types of movements (Usloviia vozniknoveniia myshechnykh perenapriazhenii pri lokalnoi fizicheskoi rabote).** Iu. V. Moikin, N. Iu. Tarasenko, B. E. Anan'ev, S. G. Kropivko, D. N. Kriukova, A. I. Mironov, V. V. Piskunov, A. C. Poberezhskaia, E. N. Pron'kova, and O. I. Iushkova (Akademiia Meditsinskikh Nauk SSSR; I Moskovskii Meditsinskii Institut, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, May 1982, p. 11-15. 8 refs. In Russian.

Attention is given to the fatigue and overexertion that manifest themselves in physical work performed by, say, only the hands. The movements are of a prescribed type, and they do not require that the entire body be in motion. Fatigue of the neuromuscular apparatus, which is related to the workload, is found to be the principal cause of muscular strain. For work involving only hand motion, a link is found between the number of movements required by a particular type of work and the incidence of such maladies as myalgia and myofascitis. C.R.

**A82-38573** † **Achievements and possibilities in the research being carried out to protect workers in the 11th five-year plan from noise and vibration (Itogi i perspektivy issledovanii po profilaktike vliianiia shuma i vibratsii na rabotaiushchikh v odinnadtsatoi piatiletke).** G. A. Suvorov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, May 1982, p. 1-4. 6 refs. In Russian.

**A82-38577** † **Histoenzymological changes in experimental animals exposed to variable noise (Gistoenzimologicheskie izmeneniia u eksperimental'nykh zhivotnykh pri vozdeistvii nepostoiannogo shuma).** O. K. Khmel'nitskii, Z. G. Grigor'eva, and K. V. Negrienko (Leningradskii Institut Usovershenstvovaniia Vrachei, Leningrad, USSR). *Gigiena i Sanitariia*, Apr. 1982, p. 92, 93. 7 refs. In Russian.

Histoenzymological changes produced in various organs of rats exposed to 5 hours daily of transportation noise at an equivalent level of 65 dB over the course of 60 days are investigated. Measurements of the concentrations of glucose-6-phosphate dehydrogenase, peroxidase, succinate dehydrogenase and lactate dehydrogenase in the follicular epithelium of the thyroid gland reveal a significant enhancement in synthetic activity and hormone production at the expense of glycolysis, the pentose cycle and the Krebs cycle following noise exposure. Cells of the zona fasciculata of the adrenal cortex showed moderate changes indicative of a reduction of energy-producing processes, while myocardial cells showed evidence of an uncharacteristic activation of the pentose cycle. A.L.W.

**A82-38578** † **Setting hygienic standards to be applied to environmental standards pertaining to the rolling stock of railroads and subway systems (Voprosy gigienicheskogo normirovaniia faktorov sredy podvizhnogo sostava zheleznykh dorog i metropolitenov).** A. A. Prokhorov and S. V. Suvorov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Gigiena i Sanitariia*, Apr. 1982, p. 79, 80. 16 refs. In Russian.

**A82-38579** † **A method of evaluating the functional state of the central nervous system of a person performing work (K metodike otsenki funktsional'nogo sostoianiia tsentral'noi nervnoi sistemy cheloveka v protsesse truda).** I. I. Ponomarenko and G. A. Antropov (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena i Sanitariia*, Apr. 1982, p. 59-61. In Russian.

A method is described that makes possible a determination of quantitative and qualitative indicators of the following: the interactions of the first and second signal systems, criteria for stress on the nervous system, and the ratios between the principal nervous processes. The state of the central nervous system is evaluated by measuring the latent reaction time to light and then determining the ratio between excitation and inhibitory processes. The latent reaction time here is measured in three series in which the light stimulus acts for 3-5 sec. C.R.

**A82-38580** † **Setting safety standards for ionizing radiation (Ob obosnovaniiakh gigienicheskogo normirovaniia ioniziruiushchego izlucheniia).** I. V. Filiushkin and I. M. Petoian (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR). *Gigiena i Sanitariia*, Apr. 1982, p. 48-51. 16 refs. In Russian.

It is pointed out that safety standards today are based on a linear concept that does not recognize a threshold. An alternative approach, one based on a recognized threshold of carcinogenic effects, is described. In deciding between these two approaches, it is necessary to know whether a threshold is an actual biological phenomenon. The way in which the zero hypothesis can be used to justify both approaches is demonstrated. C.R.

**A82-38581** † **Effect of the combined administration of antibiotic-resistant bifidobacteria and the corresponding antibiotics on the survival of irradiated mice (Vliianie sochetannogo primeneniia antibiotikoustoichivykh bifidobakterii i sootvetvuiushchikh antibiotikov na vyzhivaemost' obluchennykh myshei).** V. M. Korshunov, B. V. Pinegin, N. P. Ivanova, and V. N. Mal'tsev (II Moskovskii Gosudarstvennyi Meditsinskii Institut; Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR). *Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii*, May 1982, p. 50-53. 13 refs. In Russian.

**A82-38582** † **Delayed effects of the internal irradiation of endocrine system in female rats (Otdalennye posledstviia vnutrennego oblucheniia endokrinnoi sistemy samok krys).** V. I. Dedov (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, May-June 1982, p. 454-458. 8 refs. In Russian.

Experimental data are presented on the condition of rat endocrine system several months after a single injection of selenium-75-selenium methionine. The development of harmful side effects such as tumors of the mammary gland, uterus, and endocrine organs is shown to result from persistent disturbance of the hormonal homeostasis induced by the internal radiation. The principal pathogenetic factors in the development of the tumors are high blood levels of estrogen and prolactin combined with thyroxine deficiency. V.L.

**A82-38583** † **The effect of serotonin on the development of acute hyperthermia in rats (Vliianie serotonina na razvitie ostroi gipertermii u krys).** A. V. Konusova (Novosibirskii Gosudarstvennyi Universitet, Novosibirsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk*, Apr. 1982, p. 110-112. 7 refs. In Russian.

Injections of serotonin creatine sulfate were administered to rats following heating with a 250-W infrared lamp from a distance of 65 cm. The prior heating is found to accelerate the serotonin-induced overheating of the rat body to 42 C after the injection; however, the skin temperature of rats injected with serotonin is lower than that of rats in the control group. The effect of serotonin is found to be dose dependent and is attributed to heat transfer inhibition. V.L.

**A82-38584** † **Serotonin content of peripheral organs and tissues in rats under normal conditions and under stress during postnatal development (Soderzhanie serotonina v perifericheskikh organakh i tkaniakh v norme i pri deistvii stressa v protsesse razvitiia krys).** I. I. Lobacheva (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk*, Apr. 1982, p. 112-116. 20 refs. In Russian.

The serotonin levels of stomach, spleen, blood, and brain were determined in 4- and 16-day-old rats as well as in adult rats 70-80 days old. The serotonin levels are found to increase much more rapidly in peripheral tissues than in the brain. In response to immobilization, blood serotonin of adult rats increases, while serotonin level in stomach decreases. Stress-induced changes in the serotonin content of peripheral tissues are not evident immediately after birth, but appear at a certain point during postnatal development. Thus, such changes were not observed in 4-day-old rats but were marked in 16-day-old animals. V.L.

**A82-38585** † **The effect of laser radiation on lipid synthesis in yeast (Deistvie lazernogo izlucheniia na sintez lipidov v drozhzhakh).** L. P. Koval'-

chuk, S. A. Burtseva, and P. N. Razumovskii (Akademiia Nauk Moldavskoi SSR, Otdel Mikrobiologii, Kishinev, Moldavian SSR). *Biofizika*, vol. 27, May-June 1982, p. 554, 555. In Russian.

**A82-38586** † **Nonthermal effect of nanosecond microwave pulses on the transepithelial transport of sodium ions (Neteplovoe vozdeistvie SVCh impul'sov nanosekundnoi dlitel'nosti na transepitelial'nyi perenos ionov natriia).** N. D. Deviatkov, Z. S. Chernov, O. V. Betskii, T. A. Novskova, and A. V. Putvinskii (Akademiia Nauk SSSR, Institut Radiotekhniki i Elektronoki, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 552-555. 5 refs. In Russian.

Nonthermal biological effects of electromagnetic waves are investigated using a newly developed relativistic microwave generator based on an explosive-emission electron accelerator. The exposure of isolated frog skin to 10-ns microwave pulses of a peak power of 30 MW, at a wavelength of 3 cm, is shown to result in a marked acceleration of Na(+) transport during several minutes following irradiation.
V.L.

**A82-38587** † **The mechanism of the microwave effect on the conductivity of bilayer lipid membranes (K mekhanizmu mikrovolnogo deistviia na provodimost' bisloinykh lipidnykh membran).** S. I. Alekseev, V. V. Chertishchev, Iu. A. Kim (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 545, 546. 7 refs. In Russian.

The conductivity of bilayer lipid membranes modified with amphotericin B, gramicidin C, and tetraphenylborate has been studied as a function of specific absorbed power during microwave irradiation. The relationship between conductivity change and specific absorbed power is found to be linear. Experimental data are shown to be consistent with the hypothesis that a microwave field affects bilayer lipid membranes through local heating.
V.L.

**A82-38588** † **Ion currents through a neuron membrane during the injection of cyclic nucleotides (Ionnye toki cherez membranu neirona pri in'ektsii tsiklicheskikh nukleotidov).** E. A. Liberman, S. V. Minina, and N. E. Shklovskii-Kordi (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 542-545. 13 refs. In Russian.

**A82-38589** † **The flavin-dependent consumption of oxygen in mitochondria under illumination (Flavin-zavisimoe potreblenie kisloroda v mitokhondriiakh pri osveshchenii).** N. L. Vekshin and G. P. Mironov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 537-539. 7 refs. In Russian.

The use (absorption) of light by oxygen in an illuminated suspension of mitochondria from rat liver is described. A 5% solution of copper sulfate is used as the heat filter. The consumption of oxygen ceases when the light is turned off. Alpha-ketoglutarate accelerates the consumption, but glutamate, beta-oxybutyrate, and succinate are found to have no effect. Since rotenone and antimycin retard the process only slightly, it is thought that the consumption cannot derive from the respiratory chain. Sodium azide, however, slows the process by half. The absorption of light by oxygen is therefore seen as a consequence of photochemical involving a substrate, triplet flavins, and oxygen. It is thought likely that these reactions are for the photochemical oxidation of phospholipids and substrates of the alpha-ketoglutarate type and that they involve triplet flavins and singlet oxygen.
C.R.

**A82-38590** † **A comparison between the protonophoric and separating functions of weak dibasic acids (Sravnenie protonofornoi i razobshchaiushchei funktsii slabykh dvukhosnovnykh kislot).** E. E. Topaly, V. P. Topaly, A. F. Kozhokaru, and A. D. Rakul (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 535-537. 6 refs. In Russian.

The effect of five dibasic acids on the speed of mitochondrial respiration and on the electrical conductivity of bilayer lipid membranes is investigated. A correlation is found between the physiological and protonophoric functions of the acids. The results are seen as supporting a chemosmatic mechanism for oxidative phosphorylation.
C.R.

**A82-38591** † **The absence of the magnetic-field effect on Na/+/, K/+/-dependent ATPase (Ob otsutstvii vliianiia magnitnogo polia na Na/+/, K/+/-zavisimuiu ATFazu).** M. L. Savich, M. V. Shcheglova, L. M. Raikhman, and A. N. Kuznetsov (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR). *Biofizika*, vol. 27, May-June 1982, p. 532, 533. 8 refs. In Russian.

**A82-38592** † **Attributing macroscopic fluctuations in aqueous solutions of proteins and other substances to the class of flicker noise (Ob otnesenii makroskopicheskikh fluktuatsii v vodnykh rastvorakh belkov i drugikh veshchestv k klassu flikker-shumov).** N. V. Udal'tsova (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 529-531. 11 refs. In Russian.

A frequency analysis of macroscopic fluctuations is carried out. The spectral density, which shows how the variability of a process is distributed on the basis of frequency, is chosen as the frequency characteristic. Evaluations of the spectral density are averaged. The dependence of the density on frequency f is found to have the shape of a hyperbola, which is seen as justifying the classification of these macroscopic fluctuations as 1/f processes.
C.R.

**A82-38593** † **Determination of blood-lipoproteid dimensions by optical methods (Opredelenie razmerov lipoproteidov krovi opticheskimi metodami).** S. M. Burkitbaev, G. E. Dobretsov, and E. A. Manykin (Moskovskii Inzhenerno-Fizicheskii Institut; II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 528, 529. 8 refs. In Russian.

**A82-38594** † **Specificity of action of monovalent cations on the ATPase activity of myosin HMM-S-1 (Spetsifichnost' deistviia odnovalentnykh kationov na ATFazu subfragmenta HMM-S-1 miozina).** Z. I. Vishnevskaia (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 527, 528. In Russian.

**A82-38595** † **Changes in man's constant electric field in the course of adaptation to hypokinesia (Izmenenie postoiannogo elektricheskogo polia cheloveka v protsesse adaptatsii k usloviiam gipokinezii).** G. N. Zatsepina, S. P. Kuprin, S. V. Tul'skii, and M. N. Flerov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 520-526. 10 refs. In Russian.

It is shown that the process of adaptation to hypokinesia after normal physical stress, and vice versa, is characterized by equal values of the electric potential difference between certain fixed points of the skin. Once the state of adaptation is reached, superposition of adaptation processes does not change the mean value of the electric potential difference. The level of adaptation is the upper amplitude value of the electric potential difference for a healthy individual. V.L.

**A82-38597** † **A study of the mechanism governing the different types of behavior exhibited by the spiral excitation wave period in auricle and ventricle (Issledovanie mekhanizma razlichnogo povedeniia perioda spiral'nykh voln vozbuzhdeniia v predserdii i zheludochke).** A. K. Grenader and G. G. Zurabishvili (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 505-508. 9 refs. In Russian.

Sources of spiral excitation waves (reverberators) were generated in strips of rabbit attrial and ventricular tissues by feeding a single, properly timed electric stimulus. It is found that the source period increases during the first seconds following its appearance in attrial tissue, while showing little change in ventricular tissue. The relationship between changes in the source period and the refractoriness of heart tissue is investigated, and a model is proposed which accounts for the observed differences in the bheavior of the source period in auricle and ventricle.
V.L.

**A82-38598** † **Changes in the microelement content of muscles under denervation (Izmenenie soderzhaniia mikroelementov v myshtsakh pri denervatsii).** M. M. Ogievetskaia (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) and E. L. Zhuravleva (Ob'edinennyi Institut Iadernykh Issledovanii, Dubna, USSR). *Biofizika*, vol. 27, May-June 1982, p. 501-504. 10 refs. In Russian.

X-ray fluorescence spectrometry has been used to determine the contents of Zn, Br, and Rb in the rat musculus gastrocnemius following denervation. It is found that by the third week after denervation, the concentration of microelements increases in the denervated muscle and decreases in the intact muscle. Analysis of microelement content in the intact muscle has made it possible to identify two stages in post-denervation changes: hypertrophy and atrophy. The differences in the dynamics of concentration changes in denervated and intact cells suggest that the rate of protein decomposition and microelement utilization in denervated muscle cells are essentially different.
V.L.

**A82-38599** † **Proof of the existence of Ca/2+/-induced structural changes in stems of myosin-containing filaments of vertebrate skeletal muscles (Dokazatel'stvo sushchestvovaniia Ca/2+/ - indutsiruemogo strukturnogo perekhoda v stvolakh miozinsoderzhashchikh nitei skeletnykh myshts pozvonochnykh).** V. V. Lednev, L. K. Srebnitskaia, A. N. Kornev, and S. B. Malinchik (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 493-497. 7 refs. In Russian.

**A82-38600** † **Temperature characteristics of the ouabain-insensitive sodium flux in frog muscles (Temperaturnaia kharakteristika uabainnechuvstvitel'nogo potoka natriia v myshtse liagushki).** T. G. Ambartsumian, G. G. Marikian, and S. Ia. Adamian (Akademiia Nauk Armianskoi SSR, Fizicheskii Institut, Yerevan, Armenian SSR). *Biofizika*, vol. 27, May-June 1982, p. 489-492. 11 refs. In Russian.

**A82-38601 † Conditions leading to kinetic and thermodynamic isotopic effects in a cell (Ob usloviiakh poiavleniia kineticheskikh i termodinamicheskikh izotopnykh effektov v kletke).** A. A. Iviev, D. A. Kniazev, and A. G. Kaloshin (Vsesoiuznaia Akademiia Sel'skokhoziaistvennykh Nauk, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 485-488. 15 refs. In Russian.

A study was made of the conditions associated with thermodynamic and kinetic isotopic effects of carbon in metabolic processes. The key role of kinetic isotopic effects that occur at metabolic path bifurcations is demonstrated. It is shown that a kinetic isotopic effect involved in the reaction of pyruvate decarboxylation is the principal element of the mechanism of isotopic carbon fractionation in cells. V.L.

**A82-38602 † A possible explanation for the fluctuations in reflectivity exhibited by bilayer liped membranes excited during electrostriction (Vozmozhnaia priroda kolebanii otrazhatel'noi sposobnosti bisloinykh lipidnykh membran, vozbuzhdaemykh pri elektrostriktsii).** V. I. Pasechnik (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 469-474. 16 refs. In Russian.

**A82-38603 † A measurement of the size distribution of lipoproteins in the plasma of human blood (Izmerenie raspredeleniia po razmeram lipoproteidov plazmy krovi cheloveka).** A. N. Klimov, G. E. Shmelev, V. A. Noskin, I. F. Mamontova, L. G. Petrova-Maslakova, and N. S. Parfenova (Akademiia Nauk SSSR, Leningradskii Institut Iadernoi Fiziki, Leningrad, USSR; Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Biofizika*, vol. 27, May-June 1982, p. 458-462. 7 refs. In Russian.

It is shown that the optical displacement method can be used to investigate the size distribution of lipoprotein particles. The sensitivity of the method to changes in the distribution during the incubation of lipoprotein particles is assessed under various conditions. In particular, it is shown that in incubating lipoproteins of low density together with erythrocytes, donor properties of the lipoproteins relative to cholesterol manifest themselves; in the incubation of high-density lipoproteins with these cells, the result is more complex. Here, the lipoproteins separated from the hypercholesteremic plasma exhibit donor properties, whereas those obtained from the plasma having a normal level of cholesterol exhibit acceptor properties. C.R.

**A82-38604 † The conductivity of model protein-lipid membranes (Provodimost' model'nykh belkovo-lipidnykh membran).** S. A. Badzhinian and K. G. Manukian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Biofizika*, vol. 27, May-June 1982, p. 450-453. 11 refs. In Russian.

Artificial membranes are reconstructed using proteolipids from the white substance of cattle brains. The proteolipids differ in the extent to which they have been purified and in the content (72, 50-45, 15-8 wt %) and qualitative composition of the lipids connected to them. The conductivity of artificial membranes of all three types of proteolipids in 0.1-M solutions of alkali metal chlorides is found to be higher by two to three orders of magnitude than that of bilayer membranes composed of lecithin and the common phospholipids of the brain. In all cases, membranes composed of proteolipids that are 85-92% protein have the highest conductivity, and those of proteolipids that are 28% protein have the lowest. C.R.

**A82-38605 † Gramicidin A-induced conductance of the muscle fiber membrane (Indutsirovannaia gramitsidinom A provodimost' membrany myshechnogo volokna).** N. E. Shvinka, G. Kafier, and V. V. Malev (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR; Tsentral'nyi Institut Fiziologii i Meditsiny Truda, Berlin, East Germany). *Biofizika*, vol. 27, May-June 1982, p. 445-449. 13 refs. In Russian.

The conductance of an isolated muscle fiber induced by gramicidin A has been investigated by the method of double saccharose bridge under constant current conditions. It is shown that the conductance is directly proportional to gramicidin concentration in the solution. The results suggest that the gramicidin channel in the muscle membrane is of dimer nature. V.L.

**A82-38606 † The incorporation of an erythrocyte membrane into planar bilayer lipid membranes (Vkliuchenie membrany eritrotsitov v ploskie bisloinye lipidnye membrany).** I. N. Babunashvili and V. A. Nenashev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, May-June 1982, p. 441-444. 8 refs. In Russian.

The volt-ampere characteristics of planar bilayer lipid membranes modified by vesicles from the erythrocyte membranes of rabbits are investigated. The vesicles contain amphotericin B and tetraethylammonium. It is shown that for several minutes after the vesicle makes contact with the membrane there is partial fusion and that while this is occurring a bilayer is formed consisting of a layer of erythrocyte membrane lipids and a planar membrane layer. Approximately 30 minutes later, the erythrocyte membranes are observed to enter the planar membrane; this occurs either through fusion or through the embedment of the sealed vesicle. Higher temperatures are found to increase the probability of fusion. The sealed vesicles are embedded in the membrane asymmetrically; the area of contact is always smaller than the area without contact. C.R.

**A82-38607 † An investigation of the conformational stability of immunoglobulin G in the monolayers at the phase boundary between aqueous solutions of NaCl and octane (Issledovanie konformatsionnoi ustoichivosti immunoglobulinov G v monosloiakh na granitse faz vodnye rastvory NaCl-oktan).** L. V. Chasovnikova, N. A. Matveeva, and V. V. Lavrent'ev (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 435-440. 17 refs. In Russian.

**A82-38608 † Light curves for photosynthesis under intermittent illumination (Svetovye krivye fotosinteza pri impul'snom osveshchenii).** V. I. Zvalinskii (Akademiia Nauk SSSR, Institut Biologii Moria, Vladivostok, USSR) and F. F. Litvin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 410-414. 8 refs. In Russian.

A mathematical description is proposed for the light curve typical of intermittent-illumination photosynthesis for unicentral and multicentral organizations of photosynthetic units. It is shown that the curve shape is determined by the number of photosynthetic units per domain (degree of multicentrality) and the efficiency of energy migration between the units. A criterion is proposed for distinguishing between unicentral and multicentral photosynthetic unit organizations. V.L.

**A82-38609 † Thermodynamic parameters characterizing interaction between polymer-absorbed ligand molecules (Termodinamicheskie parametry, kharakterizuiushchie vzaimodeistvie mezhdu molekulami liganda, adsorbirovannymi na polimere).** Iu. D. Nechipurenko (Akademiia Nauk SSSR, Institut Molekuliarnoi Biologii, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 391-398. 11 refs. In Russian.

**A82-38610 † Conformational dynamics of proteins and simplest molecular 'machines' (Konformatsionnaia dinamika belkov i prosteishie molekuliarnye mashiny).** K. V. Shaitan and A. B. Rubin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 386-390. 13 refs. In Russian.

The stochastic nature of macromolecular dynamics and the coupling between the functional activity and conformational mobility of proteins are discussed with reference to experimental data obtained by Mossbauer spectroscopy. It is shown that the conformational motion of macromolecule fragments is realized by a diffusion mechanism through conformational substrates. An equation describing the operation of a simple molecular 'machine' is obtained and its solution is presented. V.L.

**A82-38611 † The temperature dependence of the H-1 NMR spectrum of hydrated collagen (Temperaturnaia zavisimost' spektra IaMR 1H gidratirovannogo kollagena).** Iu. P. Meshalkin, S. P. Gabuda, and A. F. Rzhavin (Novosibirskii Gosudarstvennyi Meditsinskii Institut; Akademiia Nauk SSSR, Institut Neorganicheskoi Khimii, Novosibirsk, USSR). *Biofizika*, vol. 27, May-June 1982, p. 375-379. 7 refs. In Russian.

By analyzing the temperature dependence of the spin-spin interaction constant, it is shown that the population probabilities for the donor and acceptor adsorption centers on the collagen surface are 1/10 or less and zero, respectively, at temperatures below 265 K. At 265-283 K, the population probabilities are 1/30 or less for the donor centers and zero for the acceptor centers. Above 283 K, the fine structure of the H-1 NMR spectra disappears due to destruction of the clathrate-like structures of the protein hydrate shell. V.L.

**A82-38612 † The effect of urea and heat on the activity of lactate dehydrogenase and glucose 6-phosphate dehydrogenase (Vliianie mocheviny i tepla na aktivnost' laktatdegidrogenazy i gliukozo-6-fosfatdegidrogenazy).** V. I. Stabrovskaia and A. D. Braun (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Biofizika*, vol. 27, May-June 1982, p. 371-374. 6 refs. In Russian.

The stability of lactate dehydrogenase and glucose 6-phosphate dehydrogenase under exposure to urea and heat was investigated within the muscle system and in an isolated state. Both enzymes were found to have higher heat stability than creatine kinase, glucose 6-phosphate dehydrogenase being the more stable enzyme. In the case of muscle exposure to urea, glucose 6-phosphate dehydrogenase had the highest stability and lactate dehydrogenase had the lowest stability among the enzymes studied. However, when the effect of urea was investigated on isolated enzymes, glucose 6-phosphate dehydrogenase proved to be the most labile of the enzymes studied. V.L.

**A82-38613 † Acridine orange inhibition of the ATPase activity of myosin and its fragments (Ingibirovanie ATFaznoi aktivnosti miozina i ego fragmentov akridinovym oranzhevym).** L. G. Filatova, I. G. Shtrankfel'd, D. I. Levitskii, and N. G. Esipova (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR; Akademiia Nauk SSSR, Institut Molekuliarnoi Biologii; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biofizika*, vol. 27, May-June 1982, p. 368-370. 8 refs. In Russian.

**A82-38614 † Reactions of O-18 exchange in the myosin systems of skeletal, cardiac, and smooth muscles (O-18-obmennye reaktsii v sisteme**

**miozina skeletnykh, serdechnoi i gladkikh myshts).** N. S. Panteleeva, E. A. Karandashov, G. G. Ivanov, I. E. Krasovskaia, N. V. Kuleva, V. M. Danilova, and M. A. Zueva (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR; Vsesoiuznyi Kardiologicheskii Nauchnyi Tsentr, Moscow, USSR; Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Biofizika*, vol. 27, May-June 1982, p. 365-367. 14 refs. In Russian.

**A82-38815 † The effect of monovalent cations on the ATPase activity and superprecipitation of actomyosin (Vliianie odnovalentnykh kationov na ATFaznuiu aktivnost' i superpretsipitatsiiu aktomiozina).** G. I. Pavliashvili, M. Sh. Simonidze, R. M. Kupatadze, and M. M. Zaalishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR). *Biofizika*, vol. 27, May-June 1982, p. 362-364. 7 refs. In Russian.

**A82-38694 F-actin is a helix with a random variable twist.** E. H. Egelman, N. Francis, and D. J. DeRosier (Brandeis University, Waltham, MA). *Nature*, vol. 298, July 8, 1982, p. 131-135. 21 refs. Grant No. NIH-GM-21189.

Electron microscopic observations and modeling of disorder in the structure of the F-actin filaments are reported. Digitized electron micrographs of negatively stained filaments were analyzed by Fourier transformations, layer line spacings were measured, and the number of units per turn were quantified. The actin filaments were found to untwist 0.5 deg per subunit. A variable twist model is constructed considering a constant axial rise of 27.3 A and a sequence of random angular deviations. An angular disorder of 10 deg was chosen and model predictions regarding the variability between cross-over points within a filament and the effects of the transform of the filaments by the presence of a variable twist were made. It is concluded that actin filaments within cross-bridged bundles are not helical and are governed by interfilament interaction. M.S.K.

**A82-38698 Similar genes for a mitochondrial ATPase subunit in the nuclear and mitochondrial genomes of Neurospora crassa.** P. van den Boogaart, J. Samallo, and E. Agsteribbe (Groningen Rijksuniversiteit, Groningen, Netherlands). *Nature*, vol. 298, July 8, 1982, p. 187-189. 17 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk.

The location and possible function of a nucleotide sequence on the mitochondrial DNA of N. crassa which encodes a dicyclohexylcarbodiimide (DCCD) protein are discussed along with its evolutionary origin. Evidence for the genetic character of the 225 nucleotide sequence includes a conservation of glycine in three positions, arginine at one, proline at one, and alanine at one, the conservation of the DCCD-binding glutamic acid at another, the absence of histidine and tryptophan, and the distribution of hydrophobic and hydrophilic amino acid residues along the polypeptide chain. Noting that the gene segment lacks a small mRNA transcript, the possibility that the gene has recently become nonfunctional is discussed. The continued presence of the gene is taken as evidence that the gene is active, has existed in Neurospora for a long time, and may have resulted from the uptake of a foreign gene. M.S.K.

**A82-38795 Changes in the human visually evoked cortical potential in response to chromatic modulation of a sinusoidal grating.** H. M. Petry, W. J. Donovan, R. K. Moore, W. B. Dixon, and L. A. Riggs (Brown University, Providence, RI). *Vision Research*, vol. 22, no. 7, 1982, p. 745-755. 38 refs. Grant No. NIH-EY-0744.

**A82-38796 Contrast influence on perceived orientation.** A. Cattaneo (CNR, Istituto di Neurofisiologia, Pisa, Italy) and D. Spinelli (Padova, Università, Padua, Italy). *Vision Research*, vol. 22, no. 7, 1982, p. 783-785. 7 refs.

When two gratings of slightly different orientation and equal contrast are presented dichoptically the observer perceives a unique fused grating at an orientation intermediate between the two. It is shown that if the contrast of the two gratings is different the perceived orientation of the fused grating depends on the relative contrast of the two monocular images. The results show that the perceived orientation varies linearly with the contrast difference, provided that the contrast values of the gratings presented to each eye are such as to give rise to a fused image. In these conditions, the perceived orientation is the average of the two monocular orientations, weighted with their contrast. (Author)

**A82-38797 Effects of reference lines on displacement thresholds at various durations of movement.** C. A. Johnson and R. P. Scobey (California, University, Davis, CA). *Vision Research*, vol. 22, no. 7, 1982, p. 819-821. 14 refs. Grants No. NIH-R01-EY-03424; No. NIH-R01-EY-01495.

Subjects were exposed to a moving line and a reference line, both in vertical orientation, in order to determine the threshold for detection of movement. The lines were projected on a CRT, with the mobile line being moved according to a ramp function, with the slope of the ramp determined by the displacement and duration of the stimulus. Movements lasted from 10-2500 msec, and trials were run with and without reference lines. The presence of the reference line was found to reduce the movement displacement detection threshold at all time intervals examined. The thresholds were not linked to a constant velocity process. Finally, the use of reference stimuli was determined to result in acuity of 12-15 arcsec among the subjects. M.S.K.

**A82-38798 Color vision in the peripheral retina under photopic conditions.** U. Stabell and B. Stabell (Oslo, Universitetet, Oslo, Norway). *Vision Research*, vol. 22, no. 7, 1982, p. 839-844. 22 refs.

**A82-38799 Hyperacuity for luminance phase angle in the human visual system.** M. J. Morgan and R. J. Watt (University College, London, England). *Vision Research*, vol. 22, no. 7, 1982, p. 863-866. 12 refs. Medical Research Council *Grant No. G979/870/N.*

A moving target with identical trajectories in the two eyes appeared shifted in depth if flickered with a phase difference between the eyes. The direction of the depth shift was the same as if the phase-lagging eye had been seeing the target with a spatial advance in the direction of target motion. Maximum acuity for this effect was in the region of 7 deg of phase angle, which may be expressed as a spatial difference between corresponding luminance points of about 13 sec arc. Acuity was approximately constant over a wide range of modulation periods from 50 to 150 msec when expressed in terms of phase angle, but fell off rapidly at higher and at lower frequencies. The results cannot be explained simply by either conventional disparity theory or by spatio-temporal interpolation, but suggest that inter-ocular correspondence is influenced by dynamic luminance information. (Author)

**A82-38802 Absorption characteristics of prolate spheroidal models exposed to the near fields of electrically small apertures.** A. Lakhtakia, M. F. Iskander, C. H. Durney, and H. Massoudi (Utah, University, Salt Lake City, UT). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, Aug. 1982, p. 569-576. 20 refs.

Irradiation of prolate spheroidal models of biological models by the near fields of electrically small apertures is analyzed. The solution procedure involves the replacement of the aperture source by an equivalent configuration of electric and magnetic dipoles. The specific absorption rate induced in the irradiated object is then calculated using the extended boundary condition method. Numerical results are presented for the exposure case where the incident electric field at the spheroid location is parallel to the major axis of the model. This polarization is associated with the maximum low-frequency absorption in biological models and, hence, is the most important polarization case in microwave dosimetry. (Author)

**A82-38823 # On the mathematical modelling of microbial age dynamic and some control aspects of microbial growth processes.** J. Ranta (Technical Research Centre of Finland, Electrical Engineering Laboratory, Esbo, Finland). *Acta Polytechnica Scandinavica, Mathematics and Computer Science Series*, no. 35, 1982. 107 p. 164 refs. Research supported by the Academy of Finland, Alfred Kordelin Foundation, Emil Aaltonen Foundation, and Finnish Cultural Foundation.

The biomass age dynamic is studied, and it is shown that the model of the age distribution dynamic can be converted into a feedback system described by a Volterra type integral equation. The latter's asymptotic properties show that the age distribution can be stabilized only by using a dilution rate with the constant specific growth rate, which is proposed. The maximum sustainable yield is found and it is shown that there is only one age distribution for which the process can be stabilized, this being the eigenvector associated with the maximum eigenvalue of the Leslie matrix. The discrete model can be presented as a bilinear system with stability properties. Dynamic equations for the average age of biomass and the variance of the average age can be produced, and the average age and age distribution can describe changes in the intercellular states of the biomass. Mathematically analogous statements can be formulated for other measures such as the DNA or protein content. C.D.

**A82-38841 The nature and rate of occurrence of medical emergencies on board Air France aircraft (Nature et fréquence des urgences médicales à bord des avions d'Air France).** J. Pasquet, J. Lavernhe, and E. Dozolme (Compagnie Nationale Air France, Service Médical, Paris, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 14-17. In French.

Illnesses and injuries requiring medical attention on board Air France aircraft during the years 1978-79 are discussed. A total of 585 events requiring medical attention and 379 uses of the emergency medical kit occurred, with seven instances leading to the necessity of requesting radio-relayed instructions from the ground. A plurality of all incidents comprised benign neurological or neurotic disorders such as excitement or anxiety, while 30.74 percent of the total cases were actual injuries such as foreign bodies in the mouth or eye. Twelve cases needing surgical intervention were encountered, including appendicitis, pancreatitis, and bleeding ulcers. The equipment, procedures, and the presence of a radio are concluded to have proved efficacious in handling the medical events which have happened on the flights. M.S.K.

**A82-38842 Physiological stresses linked to flight on airliners (Contraintes physiologiques liées au vol sur les avions de ligne).** J. Colin (Service de Santé des Armées, Paris, France). *Médecine Aéronautique et Spatiale*, vol.

21, 1st Quarter, 1982, p. 18-22. In French.

Pathological physiological conditions linked to flight on board aircraft are caused either by characteristics of the cabin atmosphere, to motions of the aircraft, or to normal functions of the aircraft, such as radio communications, vibrations, etc. Atmospheric problems which occur include hypoxia if pressurization is lost above 5000 m and barotraumatisms such as diaphragmatic spasms due to exposure to the ambient pressures at 1800 m altitude. Decompression is most dangerous to persons who have been deep-sea diving very soon prior to flight. Some protection from high altitude ionizing and nonionizing radiation is lost during flights, although the duration of flights is nominally short enough to ensure no excessive radiation is absorbed by passengers. Air sickness is largely eliminated by high altitude cruising to avoid turbulence. Finally, sound levels encountered in modern airliners are kept below the 80 dB levels which serve as a standard above which physical damage can occur. M.S.K.

**A82-38843** **Medical emergencies in flight - Pathogenic aspects (Urgences médicales en vol aspects pathogéniques).** G. Leguay (Hôpital Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 22-26. In French.

Medical emergencies which occur during flight happen with a frequency of 1/17,271 passengers, are chiefly of a benign neurological nature, and in serious cases mainly comprise coronary angina, epileptic crises, nephretic colic, or acute abdominal pain. Causes of myocardial anoxia, which is indicated by the presence of angina, are explored, including those due to the cabin conditions and the emotional stress experienced by the passenger. Although high altitude flight does offer precipitating circumstances which can lead to anginal pain, only 29 cases have been observed thus far with 20,900,000 passengers. Little evidence exists for a significant role of flight in lithogenesis or renal colic, while cases of epileptic fits have been observed at a rate of 37/20,897,000 passengers. Contributing factors which can be linked to flight are a lack of sleep, hyperventilation, and intermittent lighting levels which precipitate photogenic attacks. It is concluded that most events occurring in flight are due to a disruption of normal living patterns, a change of surroundings, fear of flying, or an alteration in medication schedules. M.S.K.

**A82-38844** **Medical emergencies on board an airliner - Procedures when a doctor is on board (Urgences médicales à bord des avions de ligne - Conduite à tenir en vol en présence d'un médecin).** P. Fourn (Union de Transports Aériens, Paris, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 26-30. In French.

**A82-38845** **Medical emergencies on board airliners - Procedures in the absence of a doctor (Les urgences médicales à bord des avions de ligne - Conduite à tenir en l'absence de médecin à bord).** P. Ledoux (Lignes Aériennes Intérieures Air Inter, Paray-Vieille-Poste, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 30-32. In French.

Procedures which a flight attendant will follow in the event of a medical emergency on board an airliner in flight when a doctor has not been found among the passengers are reviewed. An inventory is made of available medical supplies after first aid has been givin to the stricken passenger. Medications are administered from the emergency medical kit where deemed necessary while other utensils are improvised from material at hand. Advice is gained by radio communications with the ground and emergency evacuation of seriously ill persons is arranged to take place immediately upon landing. Attention is given to the process of examining the passenger, including skin color, location of pain, state of consciousness, pulse, breathing, and an assessment of the threat to the person's life due to heart malfunction. A suitable posture must be found for the passenger and oxygen from the emergency breathing apperatus must be ready. M.S.K.

**A82-38846** **Medical emergencies on board airliners - Ground management (Urgences médicales à bord des avions de ligne - Conduite à tenir ausol).** A. van Elstraete and M. Cara (Hôpital Necker, Paris, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 33-36. In French.

Ground-based assistance to medical emergencies on board an airliner in-flight include the provision of medical information, the power to deny or comply with a request for rerouting for an emergency landing, and to prepare assistance for a stricken person whose plane lands. French airports have on hand necessary medical equipment, personnel, access to other branches of an international aeromedical network, and the authority to accept a patient from a foreign aircraft which has been diverted to an emergency medical landing. A 24-hr radio monitoring service for medical emergencies was established in 1973 to operate on a high frequency unique side band reserved for medical calls. Case-history examples are outlined for instances of diverting an aircraft for an emergency landing, noting the necessity of providing for medical services at airports in different countries in order to provide life-saving medical care to seriously ill passengers. M.S.K.

**A82-38847** **Standards of physical condition for private pilots of aircraft and gliders (Normes d'aptitudes médicales des pilotes prives d'avions et de planeurs).** J. M. Masson (Tours, Université, Tours, France) and R. Auffret (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 37-39. In French.

The establishment of legal jurisdiction and the levels of health necessary for the obtaining and renewal of a private pilot's and glider pilot's license in France are discussed. The standards are noted to agree in the most part with international agreements, particularly the Chicago Convention of 1944 which required each signatory nation to ensure that pilot health standards were met domestically. The doctor who qualifies a private pilot is held directly responsible for any accidents or injuries which result from a debilitating physical condition which existed during the physical examination. A medical examiner is empowered to request a review or supplementary tests, including sonograms, ECG, and more frequent tests after the pilot reaches 40 years of age. Particular visual acuity, color perception and aural competency levels are outlined. M.S.K.

**A82-38848** **Aerobatics in light aircraft - Sensations and stresses experienced by the pilot (La voltige sur avions légers - Sensations et efforts subis par le pilote).** C. Lelaie. *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 40-42. In French.

Physical stresses experienced by pilots of light aircraft during spins are categorized into stresses from pitching motion in the vertical plane and angular accelerations in rolls or side slip. An increase in g forces of from 3.8 to 8 times normal can be incurred. The same forces can be induced in rolls and square and octagonal loops, where the maneuver places a maximum structural strain on the aircraft for a short period of time. A chief danger is in greying or blacking out of vision, which occurs in degrees depending on the pilot's physical condition and ability to concentrate, and may be lessened in effect by contraction of the abdominal muscles. Planning the rhythm of the maneuvers before entering the rolls is noted to be necessary in order to retain control. The geometry of aircraft rolls is examined, and it is noted that female pilots have displayed a greater capacity for the physical stresses of extreme maneuvers than males. M.S.K.

**A82-38849** **Medico-physiological aspects of stunt-flying (Aspects médico-physiologiques de la voltige aérienne).** A. Leger (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 43-47. In French.

Physiological stresses encountered by a pilot during aerobatic maneuvers may be manifested in cardiovascular, sensorial, hormonal, and psychological effects. Cardiovascular consequences are caused by linear accelerations in the head-buttock axis which produce both positive and negative loadings. Rotations about the same body axis produce sensory disorientation, arising from input to sensory neural receptors which have evolved for ground-based activity. Increased g forces during flying maneuvers are tolerated inversely to the magnitude of the increase, and depend on the state of fatigue, hypoglycemia, presence of alcohol, and the heat of the environment in which the pilot sits. A neural model is assumed to physically exist, which stores possible tolerable orientations, shifts of orientations, and accelerations which a human might encounter, and the introduction of sensations, shifting scenery, and accelerations on otolith organs is noted to create a conflict between stimulated organs and expectations, leading to the onset of motion sickness. M.S.K.

**A82-38850** **Physiological stresses in flying a sailplane (Les contraintes physiologiques du vol-à-voile de performance).** J. P. Crance and M. Pittaco (Nancy I, Université, Vandoeuvre-les-Nancy, Meurthe-et-Moselle, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 48-50. In French.

Flying a sailplane requires constant attention, sometimes to the extent of 19-20 hr/day. Consciousness must be focused efficiently on the ambient meteorological conditions, the instruments, navigation, and obstacles which threaten collision. Continued deteriorating flying conditions, a lack of a place to land, and even a lack of experience can lead to anxiety, fatigue, and errors in judgment. Sitting for long periods with the body inclined to the vertical by 40-50 deg, arms extended, feet reaching the control pedals, and back in a bent posture can result in a pathological lumbar condition. Severe changes in interior cabin temperature can be experienced among different terrains and at varying heights and exacerbated by sweating. Respirators must be used after an hour of flying at 4000 m, or 4 hr at 2500-3500 m, or a 20 percent reduction in mental workload capacity occurs. Finally, hypoglycemia is a danger if a substantial meal is not consumed shortly before take-off for a long flight. M.S.K

**A82-38851** **In-flight incapacitation and pathology for the light aircraft stunt-flyer (Incapacités en vol et pathologie de la voltige aérienne en avion léger).** B. Froissart, A. Hermant, and A. Milhaud. *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 51-56. 9 refs. In French.

The physiopathology of stunt flying is examined in terms of the stresses and effects induced by vertical angular accelerations. A total of 109 responses were received from questionnaires distributed to pilots, asking 400 questions regarding physiological phenomena observed by the pilots during and after stunt-flying episodes. The subjects' responses were categorized by the level of experience and type of activity. Specific queries were devoted to vertiginous and disorientational experiences, painful vertebral syndromes, black-out, loss of consciousness, convulsive trembling in the jaw or hands, and hiatal hernias during negative acceleration. A further investigation of causes of incapacity which led to accidents and fatalities revealed factors such as alcohol consumption before flight, and accelerations exceeding tolerance levels. The pathology of stunt-flying was found to be dominated by vertebral symptomology and problems with equilibration. M.S.K.

**A82-38852** **The clinical selection of astronauts at the C.P.E.M.P.N. (La sélection clinique des spationautes au C.P.E.M.P.N.).** R. Carre. *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 57-59. In French.

The process of clinically qualifying astronaut candidates at the French CPEMPN in Paris is reviewed. A medical history dossier is completed by the family doctor and the candidate before a one week clinical examination begins. An ECG is then taken for a 24 hr period, along with heart radiography, peripheral pulse readings at different points, ECG readings during maximal exercise, and phonocardiography at four frequency bands. Spirography is employed to assess ventilatory functioning, capacity, and reserves. An EEG trace is obtained in normal and hyperventilation conditions, and thorough examination is made of the lymphatic system, the thyroid, the genitals, rectum, and the abdomen by palpitation. All areas of the body are X rayed and laboratory tests are run in hematology, serology, urinology, parasitology, blood chemistry, and enzymatic activity. Clinical and functional appraisal of the ophthalmological status is obtained and dental health is assessed. Conditions of rejection are discussed. M.S.K.

**A82-38853** **Vestibular screening of cosmonauts (Sélection vestibulaire des cosmonautes).** A. Leger and G. Bezamat. *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 60-63. In French.

The methods employed in the first French clinical examinations of vestibular tolerances of astronaut candidates at the CEMPN are reviewed. Closely following Soviet practices, the candidates are exposed to a continuous application of Coriolis accelerations. Candidates are strapped into a seat which can be made to spin at 0-8 turns/sec, with monitoring proceeding on vital physiological parameters. Trials are performed in short spin modes at 180 deg/sec, constantly reversing the direction of motion, and in a long mode where spinning continues for tens of seconds, with the subject occasionally required to tilt his (her) head in response to an auditory signal. Questionnaires are filled out regarding the candidate's subjective assessment of motion sickness experiences. Assessments are made of the degree of nausea encountered, both from candidate reports and from measurements of arterial pressure. The severity of the tests is regarded as suitable in order to avoid onsets of motion sickness in actual flights. M.S.K.

**A82-38854** **Orthostatic tests during cosmonaut selection (Tests d'orthostatisme lors de la sélection des cosmonautes).** J. L. Poirier (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 1st Quarter, 1982, p. 64-71. In French.

Techniques for assessing the orthostatic tolerance to weightlessness by assessing the lower body negative pressure before flight are described. The lower part of the body is exposed to a lower barometric pressure than the upper part by placing the lower body in a neoprene-sealed cylinder. Another test is performed wherein the subject is fixed in a web on a table and tilted back, head down, at different inclinations lasting 10 min each, interspersed with five minutes in the horizontal position. Continuous monitoring proceeds of ECG, arterial pressure, and the volume variation and blood flow in the lower leg. The state of return circulation in the lower extremities is thus assessed, following the results of trials performed on board Spacelab. An assessment of the tolerance to orthostatic changes in the distribution of bodily fluids encountered during the first few hours of spaceflight and the level of hypotension which will be sustained in the first week after returning to the ground is possible with the techniques. M.S.K.

**A82-39159** **Mechanical chemical and bio-hazards.** S. M. Siegel (Hawaii, University, Honolulu, HI). *Advances in Space Research*, vol. 2, no. 3, 1982, p. 61-64.

Mechanical and chemical hazards resulting from space activities are briefly discussed, while biohazards are more extensively treated. The toxic materials that might be introduced into the atmosphere from mechanical and chemical space activity would be so slight in quantity as to pose no significant threat. Biohazards include contamination of other planets by terrestrial microorganisms, contamination of earth by extraterrestrial organisms, and contamination of earth by mutated terrestrial organisms exposed to space environments. It is concluded that the environment on other planets, including Mars, is completely inhospitable to terrestrial life forms, and that extraterrestrial forms would be so different from those of earth that they would be unable to survive in the biosphere or parasitize any organism on earth. No mutant capable of infecting or otherwise disrupting the earth's biosphere has ever been developed in scientific research, and any greatly mutated organism would not survive. C.D.

**A82-39241** † **Pathomorphological investigation of the mechanism of cochlear damage caused by noise (Patomorfologicheskoe issledovanie mekhanizma povrezhdenii ulitki shumom).** L. Voldrich (Ceskoslovenska Akademie Ved, Ustav Experimentalni Mediciny, Prague, Czechoslovakia). *Vestnik Otorinolaringologii*, July-Aug. 1982, p. 23-26. 7 refs. In Russian.

An investigation of the pathogenesis of inner ear damage in guinea pigs induced by excessive noise shows that excessive noise has a dual influence on auditory organs. Sound intensity that exceeds the limits of the mechanical rigidity of the exposed inner ear tissues (145 dB) destroys these tissues or their components. Repeated or prolonged exposure to sound at intensities not strong enough to mechanically destroy the structural integrity of the inner ear (90 dB) causes the auditory analyzer cells to die off due to an induced hyperactivity which results in the exhaustion of the cell's metabolic capabilities. N.B.

**A82-39242** † **Alterations of histochemical organization in the organ of Corti under the influence of chronic noise (Izmeneniia v gistokhimicheskoi organizatsii spiral'nogo organa pri khronicheskikh shumovykh vozdeistviiakh).** A. B. Karpanchev (Meditsinska Akademiia, Sofia, Bulgaria). *Vestnik Otorinolaringologii*, July-Aug. 1982, p. 29-31. In Russian.

A histochemical investigation of receptor cell metabolism in the organ of Corti in guinea pigs is undertaken to study the effects of chronic noise exposure on aerobic and anaerobic metabolism. A high level of activity of two enzymes, succinic dehydrogenase and lactic dehydrogenase, indicators of aerobic and anaerobic metabolism respectively, is found in the outer and inner receptor cell zones of the receptor structures of the organ of Corti. When the animals are exposed to chronic noise (85-90 dB), the activity of these enzymes decreases in some experimental animals, as reflected by a lower concentration of the reaction product in the outer and inner receptor cells. In addition to cells showing a lower activity, some cells show very little alteration of the reaction intensity. These alterations are morphological and cytochemical expressions of adaptation, overstrain and primary degeneration of receptor cells. N.B.

**A82-39243** † **Application of xylite for the detection of labyrinthine hydrops (Primenenie ksilita dlia vyiavleniia vnutrilabirintnogo gidropsa).** V. T. Pal'chun, V. I. Aslamazova, O. A. Buianovskaia, and T. S. Poliakova (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii*, July-Aug. 1982, p. 35-38. 10 refs. In Russian.

The use of xylite for detecting labyrinthine hydrops (Meniere's syndrome) is examined in order to find a compound more suitable for detecting this condition than glycerol, which has serious side effects and cannot be used in many patients. Xylite was administered in single oral doses of 0.75 to 1.5 g/kg body weight to 40 patients with Meniere's syndrome and its effects on auditory threshold values and several biochemical parameters of blood serum (potassium, sodium, sugar, total protein, osmolarity) were studied. Xylite in doses of 1 to 1.5 g/kg body weight significantly increased the levels of sugar, potassium and osmolarity and altered the auditory thresholds of the patients. The maximum dehydrating effect was obtained 2 hr after a xylite intake of 0.75-1 g/kg body weight and 1 hr after doses of 1-1.5 g/kg body weight, the latter being twice as fast as for a like amount of glycerol. Thus, xylite can be used effectively to diagnose Meniere's syndrome. N.B.

**A82-39244** † **Alterations in the labyrinth receptors after laser irradiation as detected by electron microscopy (Elektronno-mikroskopicheskoe izuchenie izmenenii v retseptorakh ushnogo labirinta pri vozdeistvii lazera).** M. P. Nikolaev, V. F. Anichin, O. P. Tokarev, and Iu. L. Tverskoi (Moskovskaia Klinicheskaia Bol'nitsa imeni S. P. Botkina; Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Nosa i Gorla, Moscow; Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Vestnik Otorinolaringologii*, July-Aug. 1982, p. 39-44. 11 refs. In Russian.

Laser irradiation of the vertical semicircular canal in rabbits was conducted to assess its usefulness in the surgical treatment of ear diseases such as Meniere's syndrome. The receptor apparatus was examined by electron microscopy at periods of 1 hr, 3 days and 1 month following pulsed laser irradiation at 250 J/sq cm. The cellular structure was completely destroyed in the vertical semicircular canal within 1 hr after irradiation, but the cellular structure of the other receptors was not damaged, although erythrocytes were observed both in the endolymphatic space and in the interstitial tissues. After three days, again no structural elements were observed in the vertical semicircular canal. However, in the remaining receptors, several ultrastructural changes had occurred, including bending of the stereocilia on the apical surface of the ampullar receptor, an outflow of part of the supporting cells' cytoplasm into the endolymphatic space, and cytoplasmic vacuolization. No structural damage was found after 1 month, although there were ultrastructural changes in the myelin nerve fibers. Thus, laser irradiation exerts only a locally destructive effect on the semicircular canal, and the ultrastructural changes observed in the other ear receptors are general biologic actions which occur under the influence of external factors. N.B.

**A82-39263** † **The cortical regulation of human motion (Korkovaia reguliatsiia dvizhenii cheloveka).** E. B. Sologub. Leningrad, Izdatel'stvo Meditsina, 1981. 184 p. 228 refs. In Russian.

The book presents results of the electroencephalographic study of systems in the cerebral cortex involved in the control of human motor activity. Problems associated with the recording of EEGs during the performance of muscular work are considered, and techniques for EEG recording during intensive exercise are presented which are suitable for use under laboratory and field conditions. The general characteristics of EEGs during muscular work are then discussed, and the specific changes associated with particular motions are examined. The formation, characteristics, programming, actualization, regulation and noise tolerance of cortical functional systems controlling motion are then discussed, and the problem of the automatization of human motions is considered. Attention is also given to interhemispheric relations during motor activity, impairments in cortical systems of motor control in fatigue and neuroses, and the relation between cortical control systems and motion effectiveness. A.L.W.

**A82-39286 † Otoneurological symptoms and syndromes (Otonevrologicheskie simptomy i sindromy).** N. S. Blagoveshchenskaia. Moscow, Izdatel'stvo Meditsina, 1981. 328 p. 146 refs. In Russian.

The book considers the auditory and vestibular symptoms and syndromes which are encountered as a result of cerebral and peripheral damage at various levels. Following a review of vestibular and auditory anatomy and physiology and the methods available for the study of the vestibular and auditory analyzers, symptoms and syndromes associated with impairments of these analyzers are discussed on the basis of vast clinical experience. Methods examined for the detection of vestibular symptoms include the recording of spontaneous nystagmus either visually or by means of electronystagmography, and vestibular tests involving caloric stimulation and rotation. The differentiation between peripheral and central vestibular syndromes is also considered, and the classification of vestibular disorders as a function of the phase of the disease and the degree of vestibular compensation is discussed. Clinical symptoms and syndromes indicative of auditory disorders addressed include noises, hypercausia, and auditory hallucinations, and the use of the Weber experiment to differentiate between cochlear and retrocochlear lesions is discussed. A.L.W.

**A82-39290 † Histamine in biochemistry and physiology (Gistamin v biokhimii i fiziologii).** I. L. Vaisfel'd and G. N. Kassil'. Moscow, Izdatel'stvo Nauka, 1981. 280 p. 710 refs. In Russian.

Various aspects of the way in which histamine figures in the physiology of human beings and animals are considered. Recent theories on the biosynthesis and metabolism of this widely distributed biogenic amine are presented, as are assessments of its importance in the neurohumoral regulation of bodily functions, in biochemical transformations, and in the diurnal rhythm of formation and excretion. Also considered are the normal working of histamine and its effect when it is interfered with in certain ways. Attention is given to the importance of the synthesizing and splitting enzymes that bind and liberate factors in the mechanisms by which histamine works on cells, organs, physiological systems, and the organism as a whole. The interaction of histamine with other biologically active substances, serotonin in particular, is discussed. C.R.

**A82-39416 † Current problems concerning the vestibulo-ocular interaction (Sovremennye problemy zritel'no-vestibuliarnogo vzaimodeistviia).** A. A. Mit'kin (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 13, July-Sept. 1982, p. 56-81. 233 refs. In Russian.

Results of recent research on the tri-neural reflex arc linking the receptors of the labyrinth with the external muscles of the eyes are reviewed, emphasizing the plasticity and adaptivity of the vestibular-eye movement reaction, which is dependent upon the participation of many nerve structures and the close interaction of afferent-efferent mechanisms in various levels of integration. The main aspects that are discussed include: the dual character of the link between the vestibular and ocular systems, the integrated functions of the vestibular nuclei, the role of the pontomedullar reticular formations in the organization of vestibulo-ocular responses, the adaptive changes in the vestibulo-ocular interactions conditioned by the vestibular section of the cerebellum, the participation of the central and peripheral zones of the retina in evaluating the parameters of movement and the postural reactions of an organism, and the unity of the mechanisms of the vestibular and optical nystagmus. N.B.

**A82-39417 † Systemic mechanisms of homeostasis (Sistemnye mekhanizmy gomeostaza).** A. N. Medelianovskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 13, July-Sept. 1982, p. 96-126. 209 refs. In Russian.

A systemic theory of homeostasis is developed, in which the basic organizational forms of the inner medium that provide adaptive behavior for an organism in its interactions with the surrounding medium are considered. Graphic models of regulation mechanisms and the direct material-energetic interactions of the most important factors of an organism's inner medium are presented. These models are suitable for a general representation of structural mechanisms of homeostasis and for the formation of algorithms for bioregulation of artificial organs. The role of mechanisms for the search of optimal conditions of the inner medium is discussed, and the applied modeling of these mechanisms is considered. A quantitative method is developed for the analysis of the state of a functional system which maintains the conditions of the inner medium. This systemic method is based on the modeling, separation, and synchronous registration of the values of the most important indicators, and the calculation of the indicators of the efficiency and the steadiness of the system. N.B.

**A82-39422 Is the CH4, H2 and CO venting from submarine hydrothermal systems produced by thermophilic bacteria.** J. A. Baross, M. D. Lilley, and L. I. Gordon (Oregon State University, Corvallis, OR). *Nature*, vol. 298, July 22, 1982, p. 366-368. 27 refs. NSF-supported research; Contract No. N00014-79-C-0004.

The results of chemical, physical, and microbiological analyses of microbial cultures obtained from eight hot water samples from black and white smoking chimneys and on a chimney wall obtained at the East Pacific Rise at 21 deg north are presented. The cultures were high in concentrations of H2S, Mn, and Fe and were found to be capable of growing in 86 C water. The culture from the hottest water held the highest amount of H2S, while the surrounding water had the lowest observed pH. Mixed cultures at 100 C displayed a 37-65 min generation time in a medium containing S, Mn, Fe, and NaHCO3, and were found to be giving off CH4 and H2. The results are concluded to be important for the fields of prokaryotic evolution, marine geochemistry, industrial microbiology, and exobiology. M.S.K.

**A82-39423 Ligation of oligonucleotides by pyrimidine dimers - A missing 'link' in the origin of life.** R. J. Lewis and P. C. Hanawalt (Stanford University, Stanford, CA). *Nature*, vol. 298, July 22, 1982, p. 393-396. 22 refs. Grant No. NIH-GM-09901-20.

It is reported that thymidine oligonucleotides annealed to polydeoxyadenylate on DNA strands can be ligated end-to-end by UV irradiation by means of thymine dimerization of the terminal nucleotides in adjacent oligonucleotides. Direct photoreversal of the linkages is then possible with 254 nm UV radiation, although cleavage by the bacteriophage T4 endonuclease V, is not possible. Further discussion is given to the possibility that high molecular weight polynucleotides in primordial seas were generated from oligonucleotides by pyrimidine dimerization induced by solar UV radiation without a protective ozone layer. It is suggested that cyclobutane pyrimidine dimer which is hostile to DNA replication and survival in present day organisms once played a role in the prebiotic assembly of primordial genetic material. M.S.K.

**A82-39426 † Abiogenic synthesis of the peptide bond. II (Abiogennyi sintez peptidnoi sviazi. II).** L. N. Moiseeva, R. F. Zaiats, and T. E. Pavlovskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Mar.-Apr. 1982, p. 230-241. 81 refs. In Russian.

Experimental approaches to abiogenic peptide synthesis in heterogeneous conditions are surveyed along with mechanisms of such synthesis. An examination of heterogeneous polycondensation of amino acids with the participation of their active forms indicates that mineral matrices can carry out catalytic functions, leading to different mechanisms of polycondensation for homogeneous and heterogeneous conditions, and to increased polymerization of amino acids. The specific character of abiogenic peptide synthesis in open systems is also considered. B.J.

**A82-39427 † Metabolism of the thermophilic hydrogenous bacterium Pseudomonas thermophila K-2 (Metabolizm termofil'noi vodorodnoi bakterii Pseudomonas thermophila K-2).** E. E. Emnova and A. K. Romanova (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Mar.-Apr. 1982, p. 271-283. 39 refs. In Russian.

**A82-39428 † Mycelial fungi, isolated from the ice sheet of the central Antarctic (Mitselial'nye griby iz tolshchi lednika tsentral'noi Antarktiki).** S. S. Abyzov (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR) and L. A. Beliakova (Akademiia Nauk SSSR, Institut Biokhimii i Fiziologii Mikroorganizmov, Pushchino, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, May-June 1982, p. 432-436. 23 refs. In Russian.

Microbiological analyses of core samples from the central Antarctic ice sheet have identified various microorganisms, including mycelial fungi preserved for a long period of time in a state of anabiosis. Attention is given to certain morphological peculiarities of the fungi, which are apparently associated with the long-term effect of extremal conditions. B.J.

**A82-39429 † Investigation of the cardiovascular system during prolonged space flights on board the Salyut space stations (Issledovaniia serdechno-sosudistoi sistemy v dlitel'nykh kosmicheskikh poletakh na orbital'nykh stantsiiakh 'Saliut').** A. D. Egorov, I. V. Alferova, O. D. Anashkin, V. I. Bernadskii, Z. A. Golubchikova, M. V. Domracheva, O. G. Itsekhovskii, I. I. Kas'ian, V. R. Liamin, and A. P. Poliakova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, July-Aug. 1982, p. 485-498. 38 refs. In Russian.

The effects of weightlessness on the cardiovascular system of cosmonauts during space flights lasting up to six months are investigated. Changes in blood circulation indicators measured at rest and during dynamic tests both during and after the flights showed no linear dependence on the length of the flight and, in general, did not increase with a lengthening of flights from one to six months. The changes in the central hemodynamics were reflected by an initial increase in the systolic volume and a longer, continuing increase from preflight levels in the circulatory minute volume. The changes in the phase structure of the cardiac cycle at rest were characterized by a reduction of the isometric phases of contraction and relaxation and a prolonging of both the sphygmic phase and the rapid filling phase. The regional hemodynamics showed an increase in the venous pressure of the jugular vein, and in the veins of the antebrachium and the tibia. Also, several parameters of arterial pressure and the peripheral resistance showed a slight tendency to decrease. Functional tests conducted during and after the flights showed a decrease in the orthostatical tolerance and physical efficiency of the cosmonauts, but this decrease remained at a constant level during flights of up to 5-6 months. N.B.

**A82-39430** † **The microflora of the central Antarctica glacier and control methods for the sterile isolation of an ice core for microbiological analyses (Mikroflora lednika Tsentral'noi Antarktiki i metody kontrolia steril'nogo otbora ledianogo kerna dlia mikrobiologicheskikh analizov).** S. S. Abyzov, V. Ia. Lipenkov, N. E. Bobin, and B. B Kudriashov (AN SSSR, Institut Mikrobiologii, Moscow; Leningradskii Gornyi Institut; Gosudarstvennyi Komitet po Gidrometeorologii i Kontroliu Prirodnoi Sredy, Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Leningrad, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, July-Aug. 1982, p. 537-548. 31 refs. In Russian.

**A82-39431** **Field sensitivity of the 'red' mechanism derived from primate local electroretinogram.** R. M. Boynton (California, University, San Diego, CA) and W. S. Baron (SRI International, Life Sciences Div., Menlo Park, CA). *Vision Research*, vol. 22, no. 8, 1982, p. 869-878. 25 refs. Grants No. NIH-EY-01451; No. NIH-EY-01579.

Using the local ERG in response to a long-wavelength stimulus as an indicator, field sensitivity functions have been obtained from cynomolgus macaque monkeys (Macaca fascicularis) with flashed and sinusoidally flickering test stimuli. These functions show the reciprocal of the relative radiance, for various adapting wavelengths, required to reduce a 667-nm test response to a criterion level. The resulting functions resemble both Stiles's pi and the S sub R function of Smith and Pokorny, provided that pis and S sub R are displaced about 7 nm toward longer wavelengths, in agreement with microspectrophotometric evidence. When field sensitivity functions are obtained with a 20 Hz sinusoidal test stimulus, using a continuous change of field wavelength, the direction of a slow spectral traverse has a large effect upon the shape of the sensitivity and phase functions - a hysteresis effect. These effects do not occur at 5 Hz. The test light is proven to be ineffective upon G cones, and it appears unlikely that measurably significant signals are significantly induced into G cones as an indirect result of the modulation of R cones. Therefore, the steady background light absorbed in the G cones seems to be influencing the response of the R cones. (Author)

**A82-39432** **Model of the accommodative mechanism in the human eye.** J. F. Koretz and G. H. Handelman (Rensselaer Polytechnic Institute, Troy, NY). *Vision Research*, vol. 22, no. 8, 1982, p. 917-927. 24 refs. Grant No. NIH-EY-02195.

**A82-39433** **Effect of chromatic adaptation on the achromatic locus - The role of contrast, luminance and background color.** J. S. Werner (Colorado, University, Boulder, CO) and J. Walraven (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Instituut voor Zintuigfysiologie TNO, Soesterberg, Netherlands). *Vision Research*, vol. 22, no. 8, 1982, p. 929-943. 54 refs.

The influences of background chromaticity and luminance and stimulus contrast on chromatic adaptation are studied in an experiment involving a white test field superposed on a range of background colors. Stimuli were presented as a flashed annulus superimposed on a circular background field, with the observer task being to adjust the intensities of the two complementary test beams making up the stimulus so as to maintain an achromatic (white) appearance. The shift in chromaticity of the achromatic point is found to be in the direction of the chromaticity of the background, with the magnitude of this shift depending directly on background luminance and inversely on contrast. Results support a model of chromatic adaptation in which the transient test and steady background fields are nonadditive, in that the background field only affects the test flash by altering the gain of cone pathways, the Vos-Walraven cone spectral sensitivities are applicable, and a proportionality is found between the attenuation of dim and bright test flashes. A.L.W.

**A82-39434** **Neurons in cat visual cortex tuned to the direction of motion in depth - Effect of positional disparity.** M. Cynader and D. Regan (Dalhousie University, Halifax, Nova Scotia, Canada). *Vision Research*, vol. 22, no. 8, 1982, p. 967-982. 30 refs. Medical Research Council of Canada Grant No. MT-5201; Natural Sciences and Engineering Research Council Grants No. A-0323; No. A-9939; Grants No. PHS-EY-02248; No. AF-AFOSR-78-3711.

**A82-39435** **Global visual processing for saccadic eye movements.** J. M. Findlay (Durham, University, Durham, England). *Vision Research*, vol. 22, no. 8, 1982, p. 1033-1045. 26 refs. Medical Research Council of England *Grant No. G977/865/N.*

Four experiments are reported in which saccadic eye movements are examined when the eye moves to targets in peripheral vision which consist of two discrete stimuli. It is found that under a variety of conditions, the saccade amplitude is such that the saccade lands at an intermediate position between the stimuli. This result has been termed the global effect and is interpreted as an influence of the global target configuration on the saccade amplitude. It is suggested that this phenomenon may be explicable in terms of activity in an ensemble of cells with large receptive fields. The experiments demonstrate the global effect in the situations of rapid automatic tracking, scanning for target detail and comparison of target configurations. The effect depends in a systematic quantitative manner on the properties of the visual stimuli. This may be loosely described by saying the saccade is directed to the center of gravity of the target configuration. But the saccades are generally directed closer to the near target than predicted by the geometric center of gravity. (Author)

**A82-39436** **Retinal location and visual localization during pursuit eye movement.** L. Mitrani and G. Dimitrov (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria). *Vision Research*, vol. 22, no. 8, 1982, p. 1047-1051. 9 refs.

Experiments were performed to measure the mislocation of a brief visual stimulus presented during pursuit eye movements in different places over the retina. The results obtained show that the mislocation for regions 5 deg from fovea in the direction of motion is greater than in fovea. This fact shows that some kind of reorganization takes place in the visual localization mechanisms during pursuit eye movements. The results cast doubts on the concept of 'perception time' which is often used to explain the visual mislocation phenomenon. (Author)

**A82-39437** **Temporal sensitivities to square-wave gratings, sawtooth-wave gratings and their fundamentals - More evidence for multiple spatial frequency channels in human vision.** T. Nagano and K. Yamagami (Ministry of International Trade and Industry, Electrotechnical Laboratory, Sakura, Ibaraki, Japan). *Vision Research*, vol. 22, no. 8, 1982, p. 1053-1056. 10 refs.

**A82-39438** **Discrimination and detection thresholds - The effect of observer criterion on the spatial properties of chromatic and achromatic mechanisms.** I. R. Moorhead and J. E. Saunders (City University, London, England). *Vision Research*, vol. 22, no. 8, 1982, p. 1057-1060. 9 refs.

**A82-39439** **Detection/discrimination in the long-wavelength pathways.** B. A. Wandell, J. Sanchez, and B. Quinn (Stanford University, Stanford, CA). *Vision Research*, vol. 22, no. 8, 1982, p. 1061-1069. 35 refs. Grant No. NIH-5-R01-EY-03164-02.

The simultaneous detection/discrimination method is applied to the mechanisms mediating the detection of long- and middle-wavelength test lights. The results suggest the following: (1) a test light detected by a signal initiated primarily in the long-wavelength receptors will be ultimately detected by different sets of nerve cells, depending upon the background illumination; (2) the discriminability of two test lights depends upon their duration, even when the lights are equated (at threshold) for visibility. (Author)

**A82-39440** **Gravity and the tilt aftereffect.** J. M. Wolfe and R. Held (MIT, Cambridge, MA). *Vision Research*, vol. 22, no. 8, 1982, p. 1075-1078. 18 refs. Grants No. NIH-EY-01191; No. NIH-EY-02621.

Wolfe and Held (1981) have reported that, following monocular exposure to a tilt aftereffect-inducing stimulus, binocularly measured tilt aftereffects were significantly smaller than either monocularly or interocularly measured effects. Interocular effects are those measured in the eye not exposed to the adapting pattern. They are smaller than monocular effects. The present investigation has the object to provide support for an hypothesis considered in the earlier study, taking into account the difference between the chevron and tilted grating versions of the tilt aftereffect. The ability of gravity to alter the grating results but not the chevron results is found to suggest that the grating results are produced, in part, by a binocular process not active in the chevron experiment. The hypothetical binocular process would be subject to vestibular influences. G.R.

**A82-39448** † **Abiogenic synthesis of the peptide bond. I (Abiogennyi sintez peptidnoi sviazi. I).** L. N. Moiseeva, R. F. Zaiats, and T. E. Pavlovskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk*

*SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1982, p. 25-43. 65 refs. In Russian.

Various experimental approaches for the abiogenic synthesis of the peptide bond in homogeneous and heterogeneous conditions are reviewed, and the likelihood of each of these processes being involved in the origin of life is examined. The role of the different energy sources, as well as the thermodynamic and physical requirements, in these processes is also discussed. Synthesis of the peptide bond under homogeneous conditions can occur in four general ways: thermal polycondensation of amino acids at high temperatures, polymerization of amino acids and their precursors under the influence of prebiological condensation agents of the carbodiimide type, polycondensation of amino acids with the participation of polyphosphate, and polycondensation of amino acids with the participation of aminoacyladenilate. Synthesis under heterogeneous conditions involves polycondensation of amino acids on the surface of minerals. N.B.

**A82-39507 # Selection and training of European astronauts (Auswahl und training Europäischer Raumfahrer).** K. E. Klein, J. R. Hordinsky, and L. Vogt (Deutsche Forschungs - und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Luft- und Raumfahrt,* vol. 3, 2nd Quarter, 1982, p. 35-38, 40-42. 11 refs. In German.

Planning for the participation of European astronauts in the Spacelab mission is discussed. The historical development of the plan, the design concept for the spacecraft and lab, and the preliminary astronaut selection process in Europe are described, including the roles of ESA and NASA. Training for the mission is discussed, including training not directly concerned with the scintific goals of the mission and that directly concerned with the payload. The ESA training program is detailed, and ideas for furthering biomedical training are discussed along with training procedures using mission and experiment simulation. C.D.

**A82-39541 Lockheed involvement in Shuttle life sciences flight experiments.** T. M. Olcott (Lockheed Research Laboratories, Palo Alto, CA). *Lockheed Horizons,* Summer 1982, p. 36-47.

The goals, procedures, and equipment for the Shuttle life sciences program, which will assess effects of microgravity environment on humans, allow continuous observations of humans in space, and include exobiological experimentation are described. Physiological and metabolic changes caused by microgravity will be monitored, along with variations due to sex, motion sickness, and bone demineralization. The role of gravity in plant growth will be assessed, as will plant and animal gravity proprioceptive mechanisms, the interaction of gravitational forces and stress or light, and effects of microgravity over several generations. Details of the Spacelab facilities and experiments are discussed in terms of the use of a plant growth unit, and animal holding facility, a general purpose work station, a vestibular research facility, and accelerators and a centrifuge. M.S.K.

**A82-39569 # Approaches to the study of the hypothalamus-pituitary gland relationship (Neki od pristupa izuchavaniu khipotalamus-khipofiza i mekhanizma povratne sprege).** P. N. Martinovich. In: Collection of papers dedicated to Pavle Savic on the occasion of his 70th birthday.
Belgrade, Srpska Akademiia Nauka i Umetnosti, 1980, p. 111-121. 33 refs. In Serbo-Croatian.

Experimental studies relating to hypothalamus-pituitary gland relationships are summarized. Particular attention is given to ovulation induced in rats by mechanically produced lesions in the region of the pituitary stalk; the effects of X-rays on anterior hypophysis; and hypothalamus releasing factors and the control of the anterior pituitary function. B.J.

**A82-39570 # Modeling and simulation in the study of certain biological systems (Modelovanje i simulatsija u ispitivanju nekikh bioloshkikh sistema).** Z. Damjanovich. In: Collection of papers dedicated to Pavle Savic on the occasion of his 70th birthday. Belgrade, Srpska Akademiia Nauka i Umetnosti, 1980, p. 123-131. In Serbo-Croatian.

Various aspects in the use of mathematical models and computer simulation to study basic biological processes are examined. Particular attention is given to the use of simulation in studies of metabolism and excitability. B.J.

**A82-39743 Image orientation for RPV ground station crew.** R. S. Harvey (Army Personnel Research Establishment, Farnborough, Hants., England). In: Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers. Bristol, England, University of Bristol, 1982, p. 24.1-24.7. 6 refs.

An experiment was carried out to determine the most appropriate image orientation for the crew in the ground station of a remotely piloted vehicle equipped with a steerable sensor. Such a sensor could provide imagery with a 'horizon-up' orientation or a 'specified-compass-direction' orientation. Each of these orientations has a different impact interpretation and vehicle navigation. (Author)

**A82-39749 Human factors of an RPV ground control station.** S. J. Page (Army Personnel Research Establishment, Farnborough, Hants., England). In: Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers. Bristol, England, University of Bristol, 1982, p. 25.1-25.3. 5 refs.

The human factors of system design are concerned with the many facets of the man in the system. The range covers not only the design of the man-machine interfaces and the general working environment but also wider issues such as task performance, selection, training and job design. As part of a research programme studying the human factors of RPV systems, a ground control station simulator was commissioned. This paper reviews the evolution and use of this simulator as a system research and development tool. (Author)

**A82-39792 † The histochemistry of enzymes in specific skin glands of the European hedgehog /Erinaceus europeaus/ during hibernation (Gistokhimiia fermentov spetsificheskikh kozhnykh zhelez evropeiskogo ezha /erinaceus europaeus/ v period zimnei spiachki).** V. E. Sokolov and N. K. Dzhemukhadze (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 264, no. 6, 1982, p. 1492-1494. 15 refs. In Russian.

**A82-39793 † The participation of the lymphatic system in the resistance of an organism to hypoxia (Uchastie limfoidnoi sistemy v rezistentnosti organizma k gipoksii).** V. T. Antonenko, N. P. Pen'kovskaia, and V. I. Danileiko (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 264, no. 6, 1982, p. 1511-1513. 13 refs. In Russian.

The relationship of changes in the cellular metabolism of the lymphatic system with the formation of resistance to altitude hypoxia is investigated. Mice were injected intraperitoneally with anti-thymocyte and anti-cytochrome sera and subjected to conditions equivalent to 11,000 m above sea level in an altitude chamber. The survival times of the mice increased by 5 and 10.4 times following injections (0.5 ml) of anti-thymocyte and anti-cytochrome sera respectively, while normal rabbit serum only slightly increased the survival times. In addition, anticytochrome injections induce decreases in the amount of lactic acid found in the liver, while after 24 hr the amount of lactic acid increases by 65-120%. The antihypoxic effect of the anti-cytochrome serum is linked with anti-cytochrome oxidase antibodies, since no antihypoxic activity remains after the serum is boiled. The antihypoxic effect is observed 30-60 min after the injections of anti-thymocvte and anti-cytochrome sera. N.B.

**A82-40277 # Experimentally determined pilot models using hovering VTOL flight data.** D. Andrisani (Purdue University, West Lafayette, IN), S. M. Bourne, and C. F. Gau. *American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug. 9-11, 1982, Paper 82-1294.* 12 p. 10 refs. Contract No. N62269-81-C-0729.

It is pointed out that the successful design of manned aircraft and their flight control systems requires careful attention to the dynamic interaction of the pilot and the vehicle. The present investigation is concerned with this interaction for a hovering VTOL. The specific approach employed in the investigation involves the use of time domain parameter identification methods to determine the mathematical model of the human pilot. In connection with the conducted research the pilot was told to precisely hover a VTOL aircraft, the X-22A, over a landing pad which moved in semirandom step like manner. The reported research involves an attempt to obtain time domain pilot models from transient responses of a manned VTOL. Attention is given to the employed two-strategy pilot model, preliminary pilot model results using that model, and a discussion of problems involved with time domain pilot modeling. G.R.

**A82-40307 † Echocardiographic characterization of heart hypertension (Ekhokardiograficheskaia kharakteristika gipertonicheskogo serdtsa).** A. I. Sinopal'nikov. *Voenno-Meditsinskii Zhurnal,* June 1982, p. 34-37. 19 refs. In Russian.

An approach to the analysis of echocardiograms of the left ventricle in patients with hypertension is proposed. It is shown that this approach makes it possible to identify different types of heart hypertension as well as different stages in the evolution of such hypertension. This approach should lead to a greater differentiation of the types of antihypertension treatments. B.J.

**A82-40308 † Factors of the natural resistance of the body and methods for studying them (Faktory estestvennoi rezistentnosti organizma i metody ikh izucheniia).** G. A. Bashmakov. *Voenno-Meditsinskii Zhurnal,* June 1982, p. 38-40. 18 refs. In Russian.

**A82-40309 † Diagnostics of disturbances of heart rhythm and conductance and their professional evaluation in flight personnel (Diagnostika naruschenii serdechnogo ritma i provodimosti i ikh ekspertnaia otsenka u letnogo sostava).** V. I. Koledenok, V. M. Kondrakov, and N. A. Lysogor, *Voenno-Meditsinskii Zhurnal,* June 1982, p. 46-49. 10 refs. In Russian.

The paper describes an investigation of the incidence of heart arrhythmias and intracardial blockades in flight personnel at rest and in conditions of measured physical loads. A large number of flight personnel ranging in age from 20 t0 54 years were tested. Heart arrhythmias and blockades were revealed in 3.5% of the tested cases in a state of rest. Physical-exercise testing led to the disclosure of hidden disturbances of heart rhythm and conductance in 10.1% of the supposedly healthy subjects. Some recommendations on the professional evaluation of such disturbances are given. B.J.

**A82-40310 † The content of cAMP and cGMP in brain tissues during adaptation to ischemia (Soderzhanie tsAMF i tsGMF pri adaptatsii tkanei mozga k ishemii).** L. V. Govorova, A. G. Ziabkina, Kh. M. Markov, Sh. S. Tashaev, and S. I. Teplov (Leningradskii Nauchno-Issledovatel'skii Neirokhirurgicheskii Institut, Leningrad; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 752-757. 16 refs. In Russian.

The participation of the adrenergic and cholinergic systems in the adaptation of the brain to ischemia, caused by the occlusion of both common carotid arteries, is studied in rats. The dynamics of cAMP and cGMP levels in the cerebral hemisphere following ischemia induced in normal animals and in rats that have undergone cervical sympathectomy show that at the onset of compensatory reactions the adrenergic mechanisms are optimal, but during prolonged brain ischemia and severe brain damage the cholinergic reactions play the leading role. In addition, these findings support previous observations which show that parasympathetic influences determine the increase in the stability of animals to extreme hypoxia. N.B.

**A82-40311 † The physiological mechanisms of the arousal response in animals under conditions of hypobiosis (Fiziologicheskie mekhanizny 'storozhevoi reaktsii' u zhivotnykh v sostoianii gipobioza).** S. A. Bugaev and E. V. Nikitina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 758-762. 9 refs. In Russian.

The arousal response is studied in rats during conditions of artificial hypobiosis as a means of investigating the mechanism of the animals' interrelation with the outside environment. The arousal response in rats during hypobiosis is characterized by an outburst of movement with a definite coordinated sequence of motion in response to a change of the animal's posture. Repeated responses of this type lead to a rapid accumulation of electromyographic activity and an increase in body temperature. These responses are more pronounced in heterothermic animals, and are accompanied by a restoration of the original body position and a significant increase in body temperature. This effective heat production in heterothermic animals during the arousal response is probably linked with the mechanism of 'special' awakening under conditions of reduced activity. N.B.

**A82-40312 † Spatial organization of the vestibular influences on the cerebellar fastigial neurons of cats (Prostranstvennaia organizatsiia vestibuliarnykh vliianii na neirony fastigial'nogo iadra koshki).** V. A. Sarkisian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR) and L. Simon (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR; Semmelweis Orvosturdomanyi Egyetem, Budapest, Hungary). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 768-775. 20 refs. In Russian.

**A82-40313 † The regulation of calcium exchange in the cells of different regions of the warm-blooded animal heart (O reguliatsii obmena kal'tsiia v kletkakh razlichnykh otdelov serdtsa teplokrovnogo zhivotnogo).** V. V. Barabanova, V. Ia. Egorov, and T. A. Smirnova (Leningradskii Gosudarstvennyi Pedagogicheskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 791-798. 10 refs. In Russian.

The effect of the specific calcium-regulating hormone calcitonin on the action potentials of contractile myocardium and pacemaker cells is studied in sexually mature and immature rabbits under conditions of a normal ionic environment and an increased calcium concentration. Results show that the regulating influence of calcitonin is exerted through the alteration of calcium ion transport in the electroexcitable channels of the membranes in various regions of the myocardium. The age specificity of the hormone's action is a result of the varying contributions of the different potential-forming ions to the action potential generation in the myocardium cells of animals of different ages. N.B.

**A82-40314 † The changes in the concentration of free amino acids in muscles during exercise (Izmeneniia soderzhaniia svobodnykh aminokislot v myshtsakh pri ikh usilennoi aktivnosti).** A. A. Viru and A. K. Eller (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 799-803. 16 refs. In Russian.

The effect of exercise on the amino acid metabolism in rats is studied by determining the concentration of free amino acids in the quadriceps femorii muscle and the liver of rats which have been subjected to swimming for 1.5 hr with a load of 6% of body weight or 12 hr without load. Results show a decrease in the concentrations of free amino acids both in the quadriceps femorii muscle and in the liver after 1.5 and 12 hr of exercise. After 1.5 hr of exercise the concentration of alanine is sharply lower, although no further decrease in alanine concentration is observed after 12 hr of exercise. The total content of oxidizable amino acids (alanine, asparagine, valine, glycine, isoleucine, and leucine) is found to decrease after 1.5 hr of exercise, but increases after 12 hr of exercise. Thus, prolonged muscular work seems to suppress the tissue catabolism of amino acids, as well as to suppress the glucose-alanine cycle in muscle. In addition, no pronounced change in the amino acid content of myocardial muscle is observed. N.B.

**A82-40315 † The gradualness of the reaction of the pituitary-adrenocortical system to activating and inhibiting signals (Gradual'nost' reaktsii gipofizarno-adrenokortikal'noi sistemy na aktiviruiushchii i tormoznyi signaly).** A. I. Bogdanov, L. P. Filaretova, and A. A. Filaretov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 804-808. 12 refs. In Russian.

The influence of electrical stimulation (0.3-1.1 mA) of the skin and injections of hydrocortisone (5-100 micrograms/kg body weight) on the functioning of the pituitary-adrenocortical system in rabbits is investigated. Results show that electrical stimulation of the skin of 0.3-0.7 mA induces a rise in the level of corticosteroids in the blood that is proportional to the electric current applied. However, an increase in the electric current to 0.9-1.1 mA results in a decrease of the hormonal response. Hydrocortisone intravenously injected immediately prior to immobilization of the rabbits for 90 min inhibits the response of the pituitary-adrenocortical system to the applied stress in proportion to the amount of hydrocortisone injected. N.B.

**A82-40316 † Trace reactions of the frog tissue metabolism on changes of ambient temperature in the frog Rana ridibunda Pall (O sledovykh reaktsiiakh tkanevogo metabolizma pri smene temperatur sredy u ozernoi liagushki Rana ridibunda Pall).** G. I. Ibraimova (Akademiia Nauk Kirgizkoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, June 1982, p. 809-813. 16 refs. In Russian.

The influence of temperature compensation on frogs which have been acclimated to cold (7 C) and ware (17-22 C) environments is investigated by observing the metabolic shifts in the acclimated frogs upon changes in the ambient temperature. Moving a frog from a cold to a warm environment causes a signigicant decrease in the temperature coefficient (Q10) of the brain and skeletal muscle tissue respiration, a trace reaction, within a 1.4-24 hr period. However, moving a frog from a warm to a cold environment results in no change of the Q10 value. The temperature coefficient of brain tissue respiration gradually begins to decrease after one hour following the transfer from a cold to a warm environment and reaches a minimum value after 24 hr. One hour after the transfer from a cold to a warm environment, the Q10 of skeletal muscles sharply increases (from 1.87 to 2.27). A plateau in Q10 occurs during 6-18 hr after the transfer, and is followed by a decrease in Q10 to 1.78 by the 24th hour. It is proposed that these responses are linked to a discordance between the permeability of the cell membrane and the activities of the cellular enzymes, which results in changes in the cellular enzyme/substrate ratios. N.B.

**A82-40435 Aging and visual function of military pilots - A review.** R. Sekuler, D. Kline, and K. Dismukes (National Research Council, Assembly of Behavioral and Social Sciences, Washington, DC). *Aviation, Space, and Environmental Medicine,* vol. 53, Aug. 1982, p. 747-758. 83 refs. Contract No. N00014-80-C-0159. NR Project 201-124.

The results of the U.S. Navy Committee on Vision survey of existing data regarding sight impairment with age and its importance to the performance of military pilots are presented. Military pilot tasks which diverge from commercial pilot responsibilities are reviewed, noting that no data specifically concerned with military pilot vision was available. Attention is given to alterations in visual functions such as light transmission, dark adaptation, acuity, contrast sensitivity, dynamic visual acuity, oculomotor behavior, the visual field, depth perception, temporal resolution, visual information processing, and perceptual organization. Methodological problems inherent in conducting cross-sectional and longitudinal tests are discussed. Significant military pilot visual factors affected by age are concluded to include contrast sensitivity, dynamic acuity, glare recovery, night vision, and information processing. M.S.K.

**A82-40436 * Rapid perceptual adaptation to high gravitoinertial force levels - Evidence for context-specific adaptation.** J. R. Lackner (Brandeis University, Waltham, MA) and A. Graybiel (U.S. Navy, Naval Aerospace Medicine Research Laboratory, Pensacola, FL). *Aviation, Space, and Environmental Medicine,* vol. 53, Aug. 1982, p. 766-769. 12 refs. Contract No. NAS9-15147. NASA Order T-9140-E.

Subjects exposed to periodic variations in gravitoinertial force (2-G peak) in parabolic flight maneuvers quickly come to perceive the peak force level as having decreased in intensity. By the end of a 40-parabola flight, the decrease in apparent force is approximately 40%. On successive flight days, the apparent intensity of the force loads seems to decrease as well, indicating a cumulative adaptive effect. None of the subjects reported feeling abnormally 'light' for more than a minute or two after return to 1-G background force levels. The pattern of findings suggests a context-specific adaptation to high-force levels. (Author)

**A82-40437 * Antimotion-sickness efficacy of scopolamine 12 and 72 hours after transdermal administration.** A. Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL), D. B. Cramer (NASA, Washington, DC; U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL), and C. D. Wood (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL; Louisiana State University, Shreveport, LA). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 770-772. 6 refs. NASA Order T-3384-G.

The antimotion sickness remedy, transdermal therapeutic system-scopolamine, administered in this experiment was scheduled to deliver 1.0 mg of scopolamine over a period of 3 d, and this paper compares its efficacy 12 and 72 h after administration. In a double-blind study, six male college students were individually exposed to a standardized provocative test in a slow rotation room after six apparently identical treatments comprising four placebos and two medications. Efficacy was categorized as beneficial, inconsequential, or detrimental. None of the responses was detrimental. Following the first administration of the therapeutic system, there were four beneficial responses after 12 h but none was beneficial after 72 h. Following the second treatment regimen, there were four beneficial responses after 12 h and three beneficial responses after 72 h. Great individual differences were demonstrated, two subjects accounting for six beneficial responses and two accounting for only one beneficial response. The difference in efficacy after 12 and 72 h has practical and theoretical significance. (Author)

**A82-40438 *** **Dynamics of subjective discomfort in motion sickness as measured with a magnitude estimation method.** O. L. Bock and C. M. Oman (MIT, Cambridge, MA). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 773-777. 27 refs. Grants No. NAG2-88; No. NCC9-1.

Eight subjects, wearing left-right vision reversing goggles, executed sequences of controlled active head movements to provoke motion sickness. Head movement sequences were interspaced with periods of eye closure and no head movement to permit partial remission of symptoms between sequences. Subjects reported the level of discomfort experienced by using a magnitude estimation technique derived from Stevens' (1957) ratio scaling method. Using this approach, we demonstrated that the time course of subjective discomfort exhibits a profile, similar in all our subjects, characterized by both fast and slow response components. The potential usefulness of magnitude estimation for research on the dynamic properties of the mechanism generating motion sickness symptoms is discussed. (Author)

**A82-40439** **Task categorization and the limits of human performance in extreme heat.** P. A. Hancock (Illinois, University, Urbana, IL). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 778-784. 43 refs.

A literature review is presented to synthesize data for the effects of extreme thermal stress on human performance in tasks of mental and cognitive skill, tracking, and complex or dual task performance. In the first category, it was found that the limit for unimpaired mental performance was close to the thermophysiological limit, with core temperature tolerance set at 1.0 F and mental performance being impaired when core temperature was raised 2.4 F. Tracking performance displays a higher decrement, with onset beginning at 1.6 F rise in core temperature. Concurrent task performance was determined to be subject to inefficiency once core temperature rises 0.4 F. Task complexity induces earlier heat stress-related losses of efficiency, and can be partially compensated for in terms of operator skill. M.S.K.

**A82-40440** **Auxiliary cooling - Comparison of air-cooled vs. water-cooled vests in hot-dry and hot-wet environments.** Y. Shapiro, K. B. Pandolf, M. N. Sawka, M. M. Toner, F. R. Winsmann, and R. F. Goldman (U.S. Army, Army Research Institute of Environmental Medicine, Natick, MA). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 785-789. 15 refs.

Twelve male subjects were exposed to hot-wet and hot-dry climatic conditions while wearing either air- or water-cooled vests in addition to nominal tank crew clothing, i.e., chemical protective uniforms. Metabolic rates were monitored in terms of heart rate, skin temperature, sweat rate, weight losses, and O2 and CO2 concentrations in the breath, while the convective heat transfer, radiative heat transfer, and the maximal evaporative cooling capacity were calculated. A lesser cardiovascular strain was found for the ventilated air-cooled vest conditions, while other parameters were equal in the hot-wet conditions. Neither type of vest furnished any sweat rate reduction in the hot-dry conditions, and the air-cooled vest was noted to potentially cause skin damage in a hot-dry environment due to high velocity hot air. M.S.K.

**A82-40441** **Thermoregulation and the menstrual cycle.** S. M. Horvath and B. L. Drinkwater (California, University, Santa Barbara, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 790-794. 27 refs. Grants No. NIH-1-R01-ES-00849; No. NIH-5-R01-OH-00896.

Eight women subjects performed exercise to 30% maximum oxygen volume uptake in 28 C-12.6 torr, 35 C-28 torr, and 48 C-8.7 torr conditions as part of trials to determine whether plasma concentrations of estradiol and progesterone associated with ovulatory, luteal, and flow phases of the menstrual cycle affect female response to exercise in warm and hot environments. The cycle day was chosen by means of body temperature or physical evidence. Each subject performed 90 m/min treadmill exercise as the grade increased 1 deg/min to verbally announced tolerance levels. Blood volume, body density, ECG, rectal temperature, skin temperature at seven sites, blood pressure, hematocrit, etc. were monitored and all exercise was performed in a pressure/temperature controlled chamber. The hormonal changes during the phases of the menstrual cycle were found to not affect the ability to exercise. M.S.K.

**A82-40442** **Effect of the Circutone seat on hemodynamic, subjective, and thermal responses to prolonged sitting.** E. Shvartz, J. G. Gaume, R. C. Reibold, E. J. Glassford, and R. T. White (Douglas Aircraft Co., Long Beach; Mercy Hospital and Medical Center, San Diego, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 795-802. 14 refs.

Eight young men were twice administered - on two different days - a series of hemodynamic (using an impedance plethysmograph), subjective, and skin temperature measurements during 5 h of quiet sitting. On one day, a Circutone seat (massage-type seat cushion) was activated for 14 min/h, and on the other day it was not. During the 'Circutone off' day, 5 h of sitting resulted in a continuous decrease in calf blood flow and an increase in venous blood pooling in the calf; an increase in blood pressure and a stable cardiac output (4.6 l/min); very low urine output; large increases in skin temperatures at the body areas in contact with the seat (thigh and lower back); and increases in various subjective responses of discomfort. The Circutone activation resulted in a substantial exchange of the stagnant blood in the calf and thigh; a tendency to increase thigh and calf blood flow; a decrease in venous pooling in the thigh; and less subjective discomfort. The Circutone activation had no effect on skin temperature. The results indicate that the Circutone seat improved seat comfort by improving local circulation, especially in the thigh, which probably accounted for the improved subjective reactions. (Author)

**A82-40443** **Central nervous dysfunctions after near-miss accidents in diving.** R. J. Vaernes (Bergen, Universitetet, Bergen, Norway) and S. Eidsvik (Naval School of Diving, Norway). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 803-807. 19 refs.

The possible differences in specific central nervous system functions in two groups of divers were studied: divers with a history of diving accidents (accident group, N = 9) and accident-free divers (non-accident group, N = 15). Both groups were characterized with a mean I.Q. level (WAIS) within the normal range. Of the nine accident group divers, eight showed abnormalities on neuropsychological tests implicating lesions on higher CNS levels. In addition, five of the accident group divers had a syndrome of subcortical/limbic dysfunctions - specific memory deficits, low autonomic reactivity, sustained attention problems, and emotional liability. The data confirmed previous findings that a severe diving accident may lead to cerebral dysfunctions. However, in contrast to the previous studies, it was found that divers with average intellectual levels can develop specific CNS dysfunctions after a near-miss diving accident. Therefore, it is concluded that a combined effect of emboli with multifocal lesions and/or a more specific effect on limbic structures represent the pathophysiology of a severe near-miss diving accident. (Author)

**A82-40444** **Neutron radiation dosimetry in high altitude flight personnel.** P. E. Baily (Texas, University, Houston, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 808-817. 29 refs.

In an attempt to determine cosmic radiation exposure in high altitude NASA flight personnel, eight WB-57F flight crewmen were monitored for a period of six months using a combination radiation dosimeter. Each dosimeter consisted of two thermoluminescent chips capable of measuring gamma dose and one Albedo and two Track Etch neutron dosimeters. A total of 78 flights were monitored consisting of 251 flight hours at altitudes above 14 km (45,000 ft). The maximum yearly dose equivalent measured was 104 mrem, a value well below the Maximum Permissible Dose (MPD) of 5.0 rem/y for occupational exposures and 0.5 rem/y for members of the general public. A discussion of the theory and use of several types of neutron dosimeters is included. (Author)

**A82-40445** **The accuracy of venturi masks at altitude.** R. B. Stonehill (Indiana, University, Indianapolis, IN) and A. G. Peoples (Wishard Memorial Hospital, Indianapolis, IN). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 818-821. 7 refs. Research supported by the American Lung Association of Indiana.

The concentration of oxygen provided in the inspired gas by five samples of a venturi mask were measured at ground level and at altitudes up to 10,000 ft for each of the oxygen port settings from 24-50% oxygen. The concentration of oxygen provided at a given setting was virtually identical for each of the five masks and was unaffected by ascent to 10,000 ft. Thus, patients with chronic hypercarbia could receive 'low flow oxygen therapy' while traveling on commercial airlines without danger of acute hypo-ventilation by utilizing a venturi mask. (Author)

**A82-40446** **Subjective response to negative air ion exposure.** L. W. Buckalew and A. Rizzuto (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). *Aviation, Space, and Environmental Medicine*, vol. 53, Aug. 1982, p. 822-823. 15 refs. USAF-sponsored research.

This study investigated specific subjective or psychological effects of relatively long exposure to negative ions generated by a conventional air purification device. Subjects - 24 males matched for age, education, physical condition, and smoking habits - were divided into a control (N=12) and an ion exposure group (N=12). The groups were subjected to 6 h normal and negatively charged atmospheres, respectively. The tests used were the Taylor Manifest Anxiety Scale (TMAS) and a self-report mood index. The analysis of TMAS change scores clearly showed no effect of negative ion exposure on anxiety. Analysis of mood index data showed significant changes in the subjective perception of both physiological state (relaxation increased) and psychological state (irritability, depression, and tenseness decreased while calmness and stimulation increased). (Author)

**A82-40447 † From a man-machine system to a social-engineering system (Ot sistemy 'chelovek-mashina' k 'sotsiotekhnicheskoi' sisteme).** A. A. Piskoppel' and L. P. Shchedrovitskii (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Voprosy Psikhologii,* May-June 1982, p. 15-25. 22 refs. In Russian.

. The concept of the man-machine system is examined. It is noted that this term covers at least three notions corresponding to three different ergonomical concepts: cybernetic, subject-oriented, and system-of-activity. Typical approaches to the definition of man-machine systems are examined in the light of this classification, and attention is given to the use of the concept of social-engineering systems in the framework of the system-of-activity approach. B.J.

**A82-40448 † An absolute threshold in psychoacoustics (Ob absoliutnom poroge v psikhoakustike).** Iu. A. Indlin (Vsesoiuznyi Nauchno-Issledovatel'skii Kinofotoinstitut, Moscow, USSR). *Voprosy Psikhologii,* May-June 1982, p. 108-112. 14 refs. In Russian.

The discussion that has ensued since the concept of internal sensory noise was introduced is summarized. The results of experiments on the detection of a signal against a background of continuous noise are presented indicating the existence of a low sensory threshold. The internal sensory noise is continuous. Consequently, a signal can be detected against a background of this noise only when the sensory effect caused by the signal exceeds an absolute sensory threshold. The magnitude of this threshold depends on the statistical characteristics of the internal noise. C.R.

**A82-40449 † A test for the prediction of risk-taking attitude in operators (Test dlia diagnostiki otnosheniia operatora k priniatiiu riska).** A. A. Kondratskii (Nauchno-Issledovatel'skii Institut Psikhologii, Ukrainian SSR). *Voprosy Psikhologii,* May-June 1982, p. 133-136. In Russian.

An apparatus designed to measure the inclination of subjects to take justified or unjustified chances, and to show unjustified (excessive) prudence, is described. The task to be performed by the subject is presented to him as a test of his sensorimotor abilities. The specific values of these inclinations are ascribed to a subject on the basis of comparing his choices of aims in consecutive trials with the actual level of his sensorimotor efficiency. N.B.

**A82-40450 † Adapting a scale for measuring competition anxiety (Adaptatsiia shkaly sorevnovatel'noi lichnostnoi trevozhnosti).** Iu. L. Khanin (Vysshaia Profsoiuznaia Shkola Kul'tury, Leningrad, USSR). *Voprosy Psikhologii,* May-June 1982, p. 136-141. 18 refs. In Russian.

Studies carried out in order to prepare a scale equivalent to that proposed by Martens (1974, 1977) are described. The intent is to make the scale suitable for use in cross-cultural studies. The Martens scale, which relies on questionnaires, is described. C.R.

**A82-40451 † The effect of inotropic factors on the postexercise characteristics of the heart (Vliianie inotropnykh faktorov na postnagruzochnye kharakteristiki serdtsa).** Ts. R. Orlova, S. E. Ragimov, V. A. Shlain, M. P. Sakharov, and A. V. Trubetskoi (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 5-7. 5 refs. In Russian.

Acute experiments performed on cats show that the postexercise characteristics of the left ventricle plotted as a relationship between the magnitudes of the maximal blood flow velocity and systolic intraventricular pressure in normal cases and in cases of inotropic exposure are close to the linear ones. Adrenalino shifts the postexercise characteristics upward and to the right, increasing both the maximal magnitude of the blood flow velocity at zero pressure and the maximal magnitude of the pressure at zero blood flow. Calcium chloride and obsidian produce a parallel shift of the postexercise characteristics. B.J.

**A82-40452 † A factor of resistance to emotional stress in the brain of rats (Faktor ustoichivosti k emotsional'nomu stressu v mozge krys).** E. A. Iumatov, Iu. G. Skotselias, N. A. Kovalenko, I. I. Votrin, K. V. Sudarkov, and S. S. Debov (I Moskovskii Meditsinskii Institut; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 21-23. 13 refs. In Russian.

A factor that promotes resistance to emotional stress is extracted from the brains of rats that are highly resistant to chronic emotional stress, and causes increased resistance to stress in rats predisposed to stress. Brain homogenates of rats resistant to stress are extracted by several different methods, heat treated, filtered on Sephadex G-15, and lyophilized. The fractions extracted, assumed to be small peptides, are low molecular weight, thermostable, and resistant to pronase hydrolysis. Injections of the partially purified stress resistance factor significantly (p less than 0.05) increases the resistance of the recipient rats to chronic stress. N.B.

**A82-40453 † The correlations of the central nervous system and thyroid functions in conditions of chronic emotional stress (Korreliatsionnye otnosheniia funktsional'nogo sostoianiia tsentral'noi nervnoi sistemy i shchitovidnoi zhelezy v usloviiakh khronicheskogo emotsional'nogo stressa).** M. G. Amiragova and M. I. Arkhangel'skaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 24-27. 11 refs. In Russian.

The correlations of the central nervous system function, determined by the time course of changes in the EEG of the cortical and subcortical regions of the brain, and the content of thyroxin in the peripheral blood, are investigated in cats exposed to chronic emotional stress. In the course of stress, induced during one week by daily four-hour immobilization of the animals in combination with aperiodic electrical stimulation, it was observed that the EEG patterns show cycles of bursts of activity of slow waves, which are first recorded in the posterior hypothalamus. The bursts of slow waves then become generalized throughout the brain, and are accompanied by a high level of thyroxin secretion. As the stress exposures are repeated, the EEG changes intensify and the thyroxin secretions continue at a high level. For several days following the cessation of electrical stimulation, the cycles of bursts of slow wave activity accompanied by enhanced thyroid function are observable. N.B.

**A82-40454 † The effect of hyperactivation of the anterior amygdaloid nucleus on heart activity during states of altered reactivity (Vliianie giperaktivatsii perednogo amigdaliarnogo iadra na deiatel'nost' serdtsa v usloviiakh ego izmenennoi reaktivnosti).** Iu. I. Pivovarov (Irkutskii Meditsinskii Institut, Irkutsk, USSR) and G. N. Kryzhanovskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 27-30. 15 refs. In Russian.

Changes in the heart reactivity of rats caused by injections of adrenaline, rausedyl, potassium chloride, and strophanthine facilitate the occurrence of cardiac rhythm abnormalities during the creation of the generator of pathologically enhanced excitation (GPEE) in the anterior amygdaloid nucleus. While the moments of rhythm abnormalities are correlated with the occurrence of GPEE epileptic activity, the pattern of cardiac rhythm abnormalities is largely determined by the specificity of action of the injected substances. Myocardial ischemia caused by the occlusion of the anterior or posterior left coronary artery causes cardiac rhythm abnormalities similar to those observed during GPEE creation in the nucleus. However, the differences in the pattern of cardiac rhythm abnormalities depend on the area of ischemia. N.B.

**A82-40455 † Prevention of heart function abnormalities during reoxygenation after ischemia by adaptation to altitude hypoxia (Preduprezhdenie postishemicheskikh reoksigenatsionnykh narushenii funktsii serdtsa s pomoshch'iu adaptatsii k vysotnoi gipoksii).** L. M. Belkina, V. A. Saltykova, E. E. Ustinova, and F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 31-33. 10 refs. In Russian.

The influence of adaptation to altitude hypoxia (2100 m) on rat myocardial contractility is studied by means of transitory ischemia induced by ligation of the descending branch of the left coronary artery and subsequent reperfusion. Ischemia causes identical depressions of heart function both in animals adapted to hypoxia and in control animals, but after reperfusion only the adapted animals show a partial recovery of contractile function. In addition, evaluation of the heart function after ischemia and reperfusion demonstrates that the hearts of animals adapted to hypoxia have the capacity to withstand isometric loads equal to those attained during adaptation, while the control animals experience substantial disorders of heart function. Thus, it is demonstrated that adaptation to hypoxia increases the resistance of the heart to damages that occur during reoxygenation. N.B.

**A82-40456 † Respiratory movements of the facial muscles and respiratory resistance (Dykhatel'nye dvizheniia litsevoi muskulatury i soprotivlenie dykhaniiu).** S. I. Frankshtein and Z. N. Sergeeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulletin' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 33, 34. 8 refs. In Russian.

**A82-40457 † The use of hyperoxic mixtures for the diagnosis of latent disturbances in the external respiration system (Ispol'zovanie giperoksicheskikh smesei dlia diagnostiki skrytykh narushenii v sisteme vneshnego dykhaniia).** L. I. Uksusova and V. P. Nizovtsev (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 93, June 1982, p. 35, 36. 9 refs. In Russian.

**A82-40458 † The toxic properties of rabbit and dog sera under controlled hyperthermia (Toksicheskie svoistva syvorotki krolikov i sobak pri**

**upravliaemoi gipertermii).** V. S. Solov'ev (Tiumenskii Gosudarstvennyi Universitet, Tyumen, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, June 1982, p. 45-47. 10 refs. In Russian.

The toxic properties of rabbit and dog blood sera obtained following controlled hyperthermia are studied in mice with reticuloendothelial system blockage, and mast cell degranulation is studied in rats during hyperthermia, in order to determine the linkage between the physiological response to hyperthermia and the functional condition of the mast cell system. The controlled hyperthermia enhanced the toxic properties of sera from rabbits and from dogs which had been given injections of thiopental sodium prior to hyperthermic treatment. Heating intensified the degranulation of mast cells in rats. In addition, the toxic properties of the sera are correlated with the rate of mast cell degranulation. It is concluded that the appearance of the toxic properties of the sera and the significant amount of mast cell degranulation during hyperthermia testifies to the systemic pattern of the pathogenesis of hyperthermia. N.B.

**A82-40459 † Diurnal changes in the duration of the S and G2 phases of the mitotic cycle in mononuclear and binuclear hepatocytes of normal and thyroxine-treated rats (Izmeneniia v techenie sutok dlitel'nosti S i G2-periodov mitoticheskogo tsikla v odno- i dvuiadernykh gepatotsitakh u normal'nykh i tiroksinizirovannykh krys).** T. V. Savchenko and Iu. A. Romanov (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 93, June 1982, p. 94-96. 6 refs. In Russian.

**A82-40460 † Occult bacterial persistence and resistance to colonization after antibiotic therapy (Skrytoe bakterionositel'stvo i kolonizatsionnaia rezistentnost' posle antibiotikoterapii).** N. M. Shustrova, O. V. Chakhava, A. A. Ivanov, and I. N. Gailonskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*, June 1982, p. 50-53. 8 refs. In Russian.

The enteral administration of antibiotics to mice and rats has been shown to induce the occult persistence of sporulating Gram-positive bacilli, inhabiting the intestine before the administration of the antibiotics. After the prolonged use of some antibiotics, the intestinal tract becomes an unsuitable environment for nonpathogenic E. Coli, which easily colonize the intestines of germ-free animals. This type of resistance to colonization is an unfavorable consequence of antibiotic therapy. B.J.

**A82-40461 † Cytogenetic effect of 5-fluoro-2desoxy uridine in the G2 phase on intact and X-irradiated crepis capillaris L cells (Tsitogeneticheskoe deistvie 5-ftor-2-dezoksiuridina v G2-faze na intaktnye i obluchennye Rentgenovskimi luchami kletki crepis capillaris L).** R. A. Azatian, V. A. Avakian, and M. S. Zakarian (Akademiia Nauk Armianskoi SSR, Institut Eksperimental'noi Biologii, Yerevan, Armenian SSR). *Tsitologiia i Genetika*, vol. 16, May-June 1982, p. 22-26. 10 refs. In Russian.

**A82-40462 † The circadian rhythm of the sensitivity of the chromosome apparatus of mice to the mutagenic effect of measles (Sutochnyi bioritm chuvstvitel'nosti khromosomnogo apparata myshei k mutagennomu deistviiu virusa kori).** N. N. Il'inskikh and G. D. Gubin (Tiumenskii Meditsinskii Institut, Tyumen, USSR). *Tsitologiia i Genetika*, vol. 16, May-June 1982, p. 59-62. 20 refs. In Russian.

**A82-40463 † Vegetative reactions to the administration of atropine and propranolol in rats that exhibit different types of behavior (Vegetativnye reaktsii pri vvedenii atropina i propranolola u krys s raznym kharakterom povedeniia).** N. M. Khonicheva (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) and M. A. Bulgakova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 433-441. 22 refs. In Russian.

**A82-40464 † Dynamics of a stabilized motor defensive conditioned reflex for different levels of motivation in irradiated rats (Dinamika uprochennogo dvigatel'no-oboronitel'nogo uslovnogo refleksa pri raznykh urovniakh motivatsii u obluchennykh krys).** A. S. Shtemberg. *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 463-471. 18 refs. In Russian.

The total-body gamma irradiation of rats with superlethal doses is shown to produce phasic disturbances of a stabilized motor defensive conditioned reflex. As the radiation syndrome progresses, sharp fluctuations in the magnitude and relations of the main cortical nervous processes are observed, with an increase in the predominant role of transmarginal inhibition. The highest level of electrical defensive reinforcement provides for maximal strengthening of temporal connections and their high stability against severe stress impacts. B.J.

**A82-40465 † Characteristics of human auditory evoked potentials during the lateralization of a 'moving' auditory image (Kharakteristiki slukhovykh vyzvannykh potentsialov cheloveka pri lateralizatsii 'dvizhushchegosia' zvukovogo obraza).** Ia. A. Al'tman, I. M. Belov, S. F. Vaitulevich, and N. V. Mal'tseva (Akademiia Nauk SSSR, Institut Fiziologii; I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 472-479. 15 refs. In Russian.

Human auditory evoked potentials were studied during the dichotic presentation of acoustic signals which produce a sensation of directed movement of an acoustic image. Such signals cause the disappearance of the P1 component of the evoked potentials and the reduction of the latencies of the N1 and P2 components as compared with the corresponding characteristics of the components during monaural stimulation and binaural stimulation with a constant interaural delay of 900 ms, which produces complete lateralization of the acoustic image. B.J.

**A82-40466 † The influence of a constant magnetic field on the epileptogenic foci in the hippocampus of rabbits (Vliianie postoiannogo magnitnogo polia na epileptogennye ochagi v gippokampe krolikov).** L. I. Tyvin (Pediatricheskii Meditsinskii Institut, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 495-501. 19 refs. In Russian.

The influence of a nonuniform magnetic field on rabbits injected with penicillin in the epileptogenic foci of the hippocampus, which gives rise to epileptic seizures, is investigated. Results show that for the control animals the activity between seizures and the number of electrographic correlates of seizures in the left hippocampus is significantly higher than in the right. Upon the application of the magnetic field, the number of epileptiform discharges between seizures remains relatively constant, but the number of electrographic correlates of the seizures increases. In addition, the interhemispherical difference in the epileptiform activity in the left and right hippocampus is accentuated in the experimental animals. A constant application of the magnetic field for 15 days does not result in any indication that the central nervous system of the animals adapted to the presence of the magnetic field. Finally, it is proposed that the effect of the magnetic field action on the experimental animals is similar to the influence of hypoxia. N.B.

**A82-40467 † Statistical analysis of neuronal impulse activity in the diencephalon during immobilization-produced emotional stress in rats (Statisticheskii analiz impul'snoi aktivnosti neironov mezhutochnogo mozga pri immobilizatsionnom emotsional'nom stresse u krys).** E. A. Kiiatkin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 502-510. 14 refs. In Russian.

**A82-40468 † The anti-stress role of the gamma-aminobutyric acid system of the brain (Antistressornaia rol' gamkergicheskoi sistemy mozga).** B. V. Andreev, Iu. D. Ignatov, Z. S. Nikitina, and I. A. Sytinskii (I Leningradskii Meditsinskii Institut; Leningradskii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 511-519. 23 refs. In Russian.

The reactions of the gamma-aminobutyric acid (GABA) system during conditions of painful and emotional stress and the functional role of the GABA mechanisms during such conditions are studied in rats. It is found that emotional and painful stress disrupts the emotional and somatic status of the animal, and is accompanied by a rise in the level of GABA and an inhibition of GABA-transaminase in the forebrain, but not in the brainstrem. Both gamma-vinyl GABA and gamma-acetyline GABA induce similar, but more pronounced, changes in GABA metabolism, reduce the number of gastric mucosal erosions, and lead to a greater metabolism of diazepam and mucin. In addition, gamma-vinyl GABA and diazepam also reduce the amount of behavioral depression following stress. GABA-negative compounds, such as picrotoxin and thiosemicarbazide, reduce the animals' resistance to stress. It is concluded that the directed activation of GABA transmission is one of the pathways of stress regulation. N.B.

**A82-40469 † The effect of the electrical stimulation of afferent pathways on neurons in septal slices (Vliianie elektricheskoi stimuliatsii afferentnykh putei na neirony v srezakh septum).** S. D. Zhadina, O. S. Vinogradova, and A. G. Bragin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 531-539. 16 refs. In Russian.

**A82-40470 † Participation of the prefrontal cortex in delayed spatial choice and differentiation of time intervals in rhesus monkeys (Uchastie prefrontal'noi kory v otsrochennom prostranstvennom vybore i differentsirovanii vremennykh intervalov u makak rezusov).** L. A. Moiseeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 549-552. 5 refs. In Russian.

**A82-40471 † An LED system for the formation of visual stimuli (Sistema formirovaniia zritel'nykh stimulov na baze svetodiodov).** S. A. Pogrebinskii (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Obshchei i Sudebnoi Psikhiatrii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, May-June 1982, p. 569, 570. In Russian.

A minicomputer-controlled LED system for the formation of visual stimuli is described, and a block diagram of the system is presented. This system satisfies the following requirements: (1) situation of the image in a single plane, perpendicular to the line of sight; (2) a rapid succession of images (in a time less than 100 ms); (3) short exposure times (of the order of milliseconds); and (4) presentation of images in different halves and parts of the field of vision (angle of sight with respect to the horizontal of not less than 2 deg). B.J.

**A82-40472 † Intrahemispherical relations of EEG slow-wave components in patients with local brain lesions (Vnutripolushamye sootnosheniia medlennovolnovykh sostavliaiushchikh EEG u bol'nykh s ochagovymi porazheniiami golovnogo mozga).** E. V. Sharova and M. A. Kulikov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 32, May-June 1982, p. 546-548. 5 refs. In Russian.

**A82-40473 † Robotics: Problems and prospects (Robototekhnika: Problemy i perspektivy).** I. M. Makarov. *Akademiia Nauk SSSR, Vestnik,* no. 5, 1982, p. 51-60. In Russian.

It is noted that by 1980 there were more than 100 models of industrial robots in the USSR, together with 7000 automated manipulators. These devices are mainly used to perform tasks that are hazardous or physically demanding. While formerly confined mostly to machine building, they are now being designed for use in mining, metallurgy, the food-processing industry, agriculture, construction, and light industry. The present five-year plan calls for 40,000-45,000 automated manipulators. C.R.

**A82-40474 † As if in weightlessness (Kak v nevesomosti).** A. Golikov and E. Ettinger. *Ogonek,* May 15, 1982. 3 p. In Russian.

The simulation of weightlessness by means of hypnosis is described. Experimental results show that functional changes produced in the body during hypnotically induced weightlessness are similar to those produced in actual weightlessness. B.J.

**A82-40475 † The combined effect of carbon monoxide and total-body vibration on the organism (O sochetannom deistvii na organizm okisi ugleroda i obshchei vibratsii).** V. V. Kustov, V. G. Litau, and S. M. Razinkin. *Gigiena Truda i Professional'nye Zabolevaniia,* June 1982, p. 15-18. 18 refs. In Russian.

The combined effect of carbon monoxide and vibration, with an accompanying noise of 90 dB, on white male rats is investigated. Results show that the combined effect of carbon monoxide and vibration enhances the development of carbon monoxide poisoning by delaying the normal development of hemoglobin compensation that is evoked by exposure to carbon monoxide. However, the effects of carbon monoxide and vibration on the level of carboxy-hemoglobin in the blood are not additive, i.e., the combined effect is less than the sum of their individual effects. In addition, the influence of vibration, as well as the combination of carbon monoxide and vibration, on the level of carboxyhemoglobin in the blood increases over the course of the experimental period, while the influence of carbon monoxide alone decreases. N.B.

**A82-40476 † State of adaptation in patients with hypertension (Sostoianie adaptatsii u bol'nykh gipertonicheskoi bolezn'iu).** I. S. Zozulia (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* May 1982, p. 72, 73. In Russian.

Adaptive capacities of the auditory, visual, and motor analyzers are studied in 40 patients with cerebral hypertension (in hypertension stages 1 and 2). Results indicate that in the early stage of hypertension, the adaptive capacities of the auditory, visual, and motor analyzers are slightly decreased, but these decreases grow far more pronounced as greater cerebral atherosclerosis is manifested during later stages of hypertension. Normalization of these adaptive capacities is observed after treatment of the patients in the biotron. In addition, it is suggested that the variations in these adaptive capacities would be a useful indicator to differentiate the earliest stages of hypertension. N.B.

**A82-40477 † The significance of the bicycle ergometer test for evaluating the work capacity in patients with hypertension (Znachenie veloergometricheskogo testa v otsenke trudosposobnosti bol'nykh gipertonicheskoi bolezn'iu).** O. A. Proskurkina, L. G. Garkusha, L. G. Stepanova, and I. A. Mikhailiuk (Dnepropetrovskii Nauchno-Issledovatel'skii Institut Vosstanovleniia i Ekspertizy Trudosposobnosti Invalidov, Dnepropetrovsk, Ukrainian SSR). *Vrachebnoe Delo,* May 1982, p. 70-72. 7 refs. In Russian.

**A82-40478 † The diagnostic value of phonoenterography in acute renal failure (Znachenie fonoenterografii dlia raspoznavaniia ostroi pochechnoi nedostatochnosti).** P. S. Semiak, V. K. Denisov, V. S. Shirokov, and A. P. Prityka (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Vrachebnoe Delo,* May 1982, p. 23-25. In Russian.

**A82-40479 † ATPase activity and the potassium ion permeability of erythrocyte membranes in the presence of serotonin and radiation (ATFaznaia aktivnost' eritrotsitarnykh membran i ikh pronitsaemost' dlia ionov kaliia v usloviiakh oblucheniia i pri deistvii serotonina).** V. V. Zhegnevskaia, M. F. Vinogradova, and V. V. Polevoi. *Leningradskii Universitet, Vestnik, Biologiia,* May 1982, p. 67-72. 22 refs. In Russian.

**A82-40480 † Changes of intracellular rest potential and the length of isolated muscle under different loads (Izmeneniia vnutrikletochnogo potentsiala pokoia i dliny izolirovannoi myshtsy pri razlichnykh ee nagruzkakh).** V. S. Darinskaia, I. D. Il'chenko, and M. I. Sologub. *Leningradskii Universitet, Vestnik, Biologiia,* May 1982, p. 62-67. 27 refs. In Russian.

**A82-40481 † Energy requirements of workers at an oil field in western Siberia (Potrebnosti v energii rabochikh-neftianikov Zapadnoi Sibiri).** G. I. Bondarev, V. Ia. Vissarionova, V. S. Dupik, T. A. Zemlianskaia, and S. A. Khotimchenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Pitaniia,* May-June 1982, p. 18-21. 11 refs. In Russian.

**A82-40482 † The role of nutrition in the changes of energy metabolism during stress (Rol' pitaniia v izmenenii energeticheskogo obmena v usloviiakh stressa).** L. E. Panin and D. I. Kuz'menko (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Voprosy Pitaniia,* May-June 1982, p. 15-18. 11 refs. In Russian.

The effect of three different isocaloric diets, which differ in the ratios of proteins, fats and carbohydrates, on energy metabolism is studied in rats exposed to stress (swimming in an aquarium at different water temperatures). Results show that the high protein-lipid diet is the most desirable under stress, since this diet promotes the transition of energy metabolism from the carbohydrate type to the lipid type, and thus contributes to the development of adaptive changes in the body during extreme stress. In addition, analyses of kidney mitochondria show dissociation of oxidative phosphorylation and inhibition of ATPase activity in rats on normal and high carbohydrate diets, but these effects are not observed in rats on the high protein-lipid diet. N.B.

**A82-40484 † An automated system for the collection and processing of cardiovascular information from athletes (Avtomatizirovannyi kompleks dlia sbora i obrabotki informatsii o serdechno-sosudistoi sisteme sportsmenov).** A. P. Grishanovich and A. I. Zav'ialov (Belorusskii Gosudarstvennyi Universitet, Minsk, Belorussian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* May 1982, p. 52, 53. In Russian.

**A82-40485 † A respirator for training in conditions of changeable respiratory mixture (Respirator dlia trenirovok v usloviiakh izmenennoi dykhatel'noi smesi).** I. M. Epshtein (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* May 1982, p. 31, 50. In Russian.

The paper describes a simple, portable respirator which does not require the chemical treatment of gases. The chief feature of this respirator is that it assures a moderate level of hypoxia and hypercapnia in the respiratory mixture. B.J.

**A82-40486 † Somatotypology and athletics (Somatotipologiia i sport).** B. A. Nikitiuk (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* May 1982, p. 26-28. 15 refs. In Russian.

An attempt is made to clarify the concept of somatotype (or constitution type) with particular reference to the application of this concept to athletics. The goals of somatotypology in athletics are defined as selective, metabolic, and explanatory of the reactivity and dynamics of ontogeny. Particular consideration is given to the norm of skeletal reaction to mechanical excitations, and to the growth (or development) dynamics of the body. B.J.

**A82-40487 † Physical activity and human requirements for energy and food substances (Fizicheskaia aktivnost' i potrebnost' cheloveka v energii i pishchevykh veshchestvakh).** V. A. Shaternikov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), M. N. Volgarev, and K. A. Korovnikov. *Teoriia i Praktika Fizicheskoi Kul'tury,* May 1982, p. 22-26. In Russian.

Tables are presented that list the requirements for a variety of nutrients. Both age and the type of work performed are taken into account, with the standards presupposing an ideal body weight. The nutritional needs of athletes are distinguished from those doing heavy labor, noting that the former require nutrients that will enable them to perform physically at a high level for a relatively short period of time. C.R.

**A82-40488 † Increasing the efficiency of running on the basis of learning algorithms and information tools (Povyshenie ekonomichnosti bega na osnove ispol'zovaniia algoritmov obucheniia i informatsionnykh sredstv).** V. L. Rostovtsev (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* May 1982, p. 17-19. In Russian.

A method is developed for increasing the efficiency of running which is based on the use of learning algorithms and information on heart rate and the main biomechanical parameters. The use of such algorithms and information tools considerably improves evaluation of the efficiency of running and makes it possible to determine a more efficient structure of running in one to three sessions. A decrease of vertical oscillations and stopping exertions was found to accompany the increase in running efficiency. B.J.

**A82-40489 † Psychic stress in athletic activity (Psikhicheskaia napriazhennost' v sportivnoi deiatel'nosti).** I. B. Viktorov (Sportkomitet, Latvian SSR), L. N. Golovnikov (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR), and A. V. Rodionov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, May 1982, p. 13-15. In Russian.

Experiments performed on boxers show that in stressful conditions there occurs a redistribution of the level of response to standard load (the morning response exceeds the evening one). Psychic components of stress predominate on days of a match. A series of control matches shows that adaptation occurs not only on the basis of the principle of functional economization but also on the basis of the principle of the homogeneity and heterogeneity of psychophysiological reactions. The heterogeneity of psychophysiological reactions can be accompanied by a negative effect of activity when it is connected with psychic functions that are largely responsible for the efficiency of the boxer. B.J.

**A82-40490 † X-ray study of loaded skeletal portions in the upper extremities of athletes engaging in karate (Rentgenologicheskoe issledovanie nagruzhaemykh otdelov skeleta verkhnikh konechnostei sportsmenov, zanimaiushchikhsia karate).** S. G. Antonov and V. N. Shustov (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, May 1982, p. 71-77. 9 refs. In Russian.

**A82-40491 † Cytoarchitectronics of the epidermis and the epidermal proliferative units /EPU/ (Tsitoarkhitektonika epidermisa i epidermal'nye proliferativnye edinitsy /EPE/).** G. Ia. Grafova (Voenno-Meditsinskaia Akademiia, Lenningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, Apr. 1982, p. 73-85. 59 refs. In Russian.

**A82-40492 † Peculiarities of the relief of the trabecular surface of the spongy substance of the human vertebrae (Osobennosti rel'efa poverkhnosti trabekul gubchatogo veshchestva pozvonkov u cheloveka).** A. A. Doktorov and Iu. I. Denisov-Nikol'skii (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skaia Laboratoriia Biologicheskikh Struktur, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, May 1982, p. 61-70. 30 refs. In Russian.

**A82-40493 † The response of the venous walls in the extremities to a disturbed venous outflow (Reaktsiia stenki ven konechnostei na narushenie venoznogo ottoka).** I. M. Baibekov and V. A. Khoroshaev (Akademiia Meditsinskikh Nauk SSSR, Tashkent, Uzbek SSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, May 1982, p. 45-51. 16 refs. In Russian.

The dynamics of morphological changes occurring in the veins of rabbit and rat pelvic extremities are studied by means of light and electron microscopy at various time intervals of venous congestion produced by the ligation of the posterior vena cava. During early postoperative stages, lesions of the venous endothelium appear, and are manifested by an increased permeability of the endothelial cells, thickening of the borders between endotheliocytes, interaction with blood cells, exfoliation from the basal membrane, and an increased pinocyte activity. Later, the inner membranes of the venous walls thicken, at first due to the migration of blood leukocytes into the subendothelial layer, and then due to the appearance of a typical smooth muscle cells and fibroblasts. After 1-2 months, intimosclerosis begins to develop, collagenous fibers appear, and a proliferation of all types of cells in the venous walls takes place. The primary cause of the damage to the endothelial cells is hypoxia of the venous walls, which also results in phlebosclerosis of the venous wall structures. N.B.

**A82-40494 † Changes in neurons of the spinal cord and spinal ganglia under hypokinesia /neuromorphological and histochemical investigation/ (Izmeneniia neironov spinnogo mozga i spinnomozgovykh uzlov pri gipokinezii /neiromorfologicheskoe i gistokhimicheskoe issledovanie/).** R. A. Nasyrov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) and G. V. Konovalov (Semipalatinskii Meditsinskii Institut, Semipalatinsk, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, May 1982, p. 27-32. 13 refs. In Russian.

**A82-40495 † Afferent associative and commissural projections of the cortical vestibular zone VI of cats (Afferentnye assotsiativnye i komissural'nye proektsii korkovoi vestibuliarnoi zony VI u koshki).** F. N. Makarov and T. F. Kuleshova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, Apr. 1982, p. 25-30. 32 refs. In Russian.

**A82-40496 † Age changes in the cerebral cortex of humans and cats /A comparative electron-microscopical investigation/ (Vozrastnye izmeneniia kory mozga cheloveka i koshki /Sravnitel'noe elektronno-mikroskopicheskoe issledovanie/).** A. S. Iontov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and V. F. Shefer (Leningradskii Nauchno-Issledovatel'skii Psikhonevrologicheskii Institut, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, Apr. 1982, p. 13-20. 24 refs. In Russian.

**A82-40497 † The microcirculatory bed of the lungs after an effect exerted on the right vagus nerve (Mikrotsirkuliatornoe ruslo legkikh pri vozdeistvii na pravyi bluzhdaiushchii nerv).** P. N. Aleksandrov, V. I. Chumakov, and V. E. Krasnikov (Akademiia Meditsinskikh Nauk SSSR, Moscow; Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 10-12. 6 refs. In Russian.

**A82-40498 † The cause of high-altitude acute pulmonary edema (O prichinakh vysotnogo ostrogo oteka legkikh).** E. M. Ismailov (Kirgizskii Meditsinskii Institut, Frunze, Kirgiz SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 21-25. 6 refs. In Russian.

The possible role of shifts in functional systems in the triggering of high-altitude acute pulmonary edema is examined. Attention is given to thy significance of hypo- and hyper-proteinemia, hypo- and hyper-volemia, the blocking of alpha and beta adrenoreceptors, atropinization, glomectomy, increases in central blood volume and pressure in pulmonary vessels, and increases in the permeability of these vessels. B.J.

**A82-40499 † The early reaction of the hemopoietic organs to stress, depending on the condition of the peripheral M-cholinergic systems (Ranniaia reaktsiia krovetvornykh organov na stress-vozdeistvie v zavisimosti ot sostoianiia perifericheskikh M-kholinoreaktivnykh sistem).** Iu. B. Deshevoi. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 25-27. 10 refs. In Russian.

Rats were subjected to six-hour immobilization during atropine block or aceclidine stimulation of the peripheral M-cholinergic receptors. It is shown that the injection of the agents did not produce any essential effect on the cellular reaction of the bone marrow and lymphoid organs to the immobilization stress. Atropine injection intensified while aceclidine injection reduced the degree of poststress lymphopenia and neutrophilia. B.J.

**A82-40500 † The effect of products erythrocyte destruction on immunological processes (Vliianie produktov raspada eritrotsitov na immunologicheskie protsessy).** E. G. Kirdei and V. I. Nechaev (Irkutskii Meditsinskii Institut, Irkutsk, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 27-30. 12 refs. In Russian.

Tests performed on white mice showed that the products of erythrocyte destruction had a stimulating effect on the resistance to infection, antibody formation, blood serium bactericidal and complementary activity, granulocyte phagocytic activity, allograft rejection, and macrophage cytotoxic activity. These data indicate that erythrocyte-destruction products contribute to the regulation of the immune response by the activation of the macrophagal-granulocytic link of immunogenesis. B.J.

**A82-40501 † The synthesis of nuclear and mitochondrial DNA and RNA, and the synthesis of heme and globin in rabbit bone marrow during the stimulation of erythropoiesis (Sintez iadernykh mitokhondrial'nykh DNK i RNK, sintez gema i globina v kostnom mozge krolikov pri stimuliatsii eritropoeza).** Iu. D. Goncharenko and A. D. Pavlov (Riazanskii Meditsinskii Institut, Ryazan, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 36-39. 18 refs. In Russian.

**A82-40502 † The effect of hypokinesia on the resistance of the heart to hypoxia (O vliianii gipokinezii na rezistentnost' serdtsa k gipoksii).** E. A. Markova, V. M. Gandziuk, and I. L. Popovich (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 46-50. 19 refs. In Russian.

Experiments performed on white mice show that hypokinesia reduces the resistance of the heart to acute hypoxia and changes the character of the effect of adrenaline and inderal on the heart's tolerance to hypoxia. These data are explained from the vantage point of the heterochronous decrease in the synthesis of protein structures of the sarcolemma and the myocardiocytic sarcoplasmic reticulum during hypokinesia, as a consequence of which the cation pump capacity decreases and a change is produced in the relation between the effect of adrenaline on two differently directed processes, determining the efficiency of oxygen utilization by the mitochondria. B.J.

**A82-40503 † Changes in mineralized tissues in the case of calcitonin and somatotropic hormone injections under hypokinesia (Izmeneniia v mineralizovannykh tkaniakh pri vvedenii kal'tsitonina i somatotropnogo gormona v usloviiakh gipokinezii).** A. I. Volozhin and R. A. Druzhinina (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, May-June 1982, p. 64-67. 7 refs. In Russian.

The effect of daily subcutaneous injections of calcitonin (CT) and somatotropic hormone (STH) on the structure of the femur and the alveolar process was investigated on unrestrained and hypokinetic rats. CT was found to activate osteogenesis and inhibit bone-tissue resorption to a greater extent in rats allowed free movement than in immobilized rats. STH injections given for 10 and 20 days did not have a protective effect on the bone when movements were restricted. CT injection was found to inhibit the development of a dystrophic in the alveolar process induced by long-term hypokinesia. B.J.

**A82-40504 † The effect of denervation and tendotomy on oxidative phosphorylation in the skeletal muscles of the rabbit and on the resistance of phosphorylation to uncoupling agents (Vliianie denervatsii i tendotomii na okislitel'noe fosforilirovanie v skeletnykm myshtsakh krolika i rezistentnost' fosforilirovaniia k razobshchaiushchim agentam).** M. A. Shvets (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* May-June 1982, p. 76-78. 10 refs. In Russian.

**A82-40560 # Psychological investigation of pilot behavior during integration of control systems in the cockpit of passenger airliners (Psychologische Untersuchung des Pilotenverhaltens Bediensystemintegration im Cockpit von Verkehrsflugzeugen).** F. V. Schick. Braunschweig, Technische Universität, Naturwissenschaftliche Fakultät, Doktor der Naturwissenschaften Dissertation, 1980. 143 p. 27 refs. In German.

The influence of modifications in passenger airliner control systems on pilot behavior is experimentally investigated. The experimental setup is described in detail, including the division of labor in the cockpit, the simulated flight mission, and the choice of measurement and registration procedures. The data evaluation and results are discussed, including the influence of turbulence, control system component configuration, and practice on handling speed, as well as visual aspects. The results are interpreted for general aspects of control systems. C.D.

**A82-40642 † Higher integrative systems of the brain (Vysshie integrativnye sistemy mozga).** A. S. Batuev. Leningrad, Izdatel'stvo Nauka, 1981. 256 p. 563 refs. In Russian.

The book reviews experimental data concerning the physiology of the association systems of the brain and their role in the formation of complex forms of behavior in animals and humans. Particular attention is devoted to the neuronal and synaptic organization and the neurophysiological characteristics of the higher association systems of the brain, the thalamoparietal and the thalamofrontal association systems. The features of the evolutionary and ontogenic development of the association systems, and their participation in the mechanisms of information processing and in the processes of the directing and programming activities of the brain are examined. Also discussed is the role of the association systems in the programming activities of the brain which are based on dominating motivations, and on the structural accuracy of the surrounding environment, resulting in the formation of the functional structure of behavioral acts. N.B.

**A82-40643 † Space gastroenterology (Kosmicheskaia gastroenterologiia).** K. V. Smirnov and A. M. Ugolev. Moscow, Izdatel'stvo Nauka, 1981. 280 p. 375 refs. In Russian.

A monographic review of studies dealing with space gastroenterology is presented, with an emphasis on the results of studies of the digestive system of cosmonauts obtained during flights of the Soyuz and Salyut spacecraft. The introductory chapters are devoted to a general description of gastroenterological principles and methods, especially as applied to spacefight conditions involving humans and animals. This analysis is followed by chapters devoted to different factors involved in space gastroenterology, including: factors of spaceflight and the digestive system during hypokinesia and acceleration, the effect of space diet on the function of the digestive-system, and the mechanism of the influence of spaceflight factors on the digestive system. A concluding chapter presents a synthesis of the general features of the functioning of the digestive system during spaceflight conditions. N.B.

**A82-40646 † Neurochemical mechanisms of learning and memory (Neirokhimicheskie mekhanizmy obucheniia i pamiati).** R. I. Kruglikov. Moscow, Izdatel'stvo Nauka, 1981. 212 p. 515 refs. In Russian.

The roles of neurochemical systems and the metabolism of nucleic acids and proteins in the processes of learning and memory are reviewed. After a detailed survey of previous studies concerning the neurochemical mechanisms of learning and memory, the roles of the neuron mediating systems of the brain in the processes of learning and memory are analyzed, focusing on the cholinergic, serotonin, and catecholamine systems. The metabolism of proteins in the brain and its relation to learning and memory are discussed. In addition, the mechanisms for the participation of the neuron mediating systems of the brain in the processes of learning and memory are examined, giving consideration to the interactions of the neuron mediating systems, the regulating influence of serotonin on the protein metabolism of the brain, and the role of the catecholamine mechanisms of the brain in the regulation of the chemoreactive properties of the cerebral neurons. N.B.

**A82-40649 Proceedings of a Meeting of the IUPS Commission on Gravitational Physiology.** Physiologist, Supplement, *vol. 22, Dec. 1979 (1982). 88 p. (For individual items see A82-40650 to A82-40685)*

Topics discussed include procedural approaches to gravitational physiology, methodological aspects of future cardiovascular research in space, and low-G simulation in mammalian research. Particular papers are presented on a rat model for the simulation of certain aspects of space flight, cardiovascular responses to isometric exercise during simulated zero gravity, the morphogenesis of a higher plant from cultured cells and embryos in space, and centrifuge high-g effects on temperature regulation in unanesthetized rats. Also considered are the effect of baroreceptor denervation on +Gz tolerance in dogs, the dynamics of weight loss during prolonged space flight, and the effects of horizontal hypokinesia on performance and circadian physiological rhythms in female humans. B.J.

**A82-40650 # Gravitational scale effects.** T. A. McMahon (Harvard University, Cambridge, MA). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-5, S-6. 5 refs.

Some simple aspects of the performance of living organisms as a function of gravity and size are considered. Gravitational scale effects related to the walking and running of animals are considered, with particular attention given to a ballistic walking model; the walking of the Apollo astronauts on the moon is discussed. In addition, gravitational scale effects on trees growing on other planets (the moon and Jupiter) are examined. B.J.

**A82-40651 * # Study of high-g effects in animals.** A. H. Smith (California, University, Davis, CA). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-7 to S-10. NSF Grant No. G-2255; Grants No. NGR-05-004-008; No. NsG-7493.

General aspects of animal centrifugation are examined. It is shown that once a covariance is established and the nature of the kinetics is determined it is possible to calculate a regression of the biological change (with suitable numerical transforms of the data) upon field strength. This should yield a rather simple equation containing two arbitrary constants: a, the zero intercept (a mathematical prediction of the magnitude of the parameter y, when $G = 0$); and b, the proportionality coefficient, the change in the parameter y per unit change in G: $Y = a + bG$. B.J.

**A82-40652 # Methodological aspects of future cardiovascular research in space.** K. Kirsch, L. Röcker, and H. J. Wicke (Berlin, Freie Universität, Berlin, West Germany). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-11 to S-14. 10 refs.

The exposure of man to a zero-g environment creates unique experimental conditions, which disclose certain functional characteristics of the cardiovascular system that might play an important role in terrestrial physiology. This paper describes instrumentation developed for cardiovascular studies in space flight. Particular consideration is given to: (1) a device which permits repeated recording of the pressure in the antecubital vein; and (2) ultrasonic pulse equipment for studying fluid migration on the body axis. B.J.

**A82-40653 # Research opportunities and limitations of protracted hypogravity simulations for plant gravitational physiology.** A. H. Brown (Pennsylvania, University, Philadelphia, PA). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-15 to S-18. 32 refs.

Various aspects of the use of clinostats for protracted hypogravity simulation on plants are examined. Consideration is given to the quantitative characterization of a plant's bioaccelerometer functions; the morphological dependence on the g-force; the determination of the persistence of circumnutation in the absence of a determining effect of gravity; the establishment of the g-dependence of a physiological trait over a range of g-levels; the exploration of the limits of the reciprocity rule; and the use of clinostats to simulate whatever g-condition may be planned for a space experiment. The limitations of the use of clinostats are also considered. B.J.

**A82-40654 * # Low-G simulation in mammalian research.** H. Sandler (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-19 to S-22. 23 refs.

After a review of space-flight research concerning the effects of weightlessness on mammals, the paper reviews various methods of low-G simulation. Consideration is given to water immersion; bed rest, chair rest, and confinement; immobilization; and partial body-support systems. Countermeasures to offset the effects of weightlessness are also discussed. B.J.

**A82-40655 * # A new rat model simulating some aspects of space flight.** E. R. Morey, E. E. Sabelman, R. T. Turner, and D. J. Baylink (NASA, Ames Research Center, Moffett Field, CA; U.S. Veterans Administration Medical Center, Tacoma, WA). *Physiologist, Supplement,* vol. 22, Dec. 1979 (1982), p. S-23, S-24.

A rat suspension model to simulate the effects of weightlessness was developed by U.S. researchers coincident with U.S. involvement in Cosmos-satellite studies. This paper presents some preliminary data dealing with weight gain, food consumption, and bone formation in the rat model as compared with data from the Cosmos 782 and 936 experiments. It is shown that significant changes in bone formation rates may occur during a space flight lasting only five days. B.J.

**A82-40656 # Effects of a weighlessness simulation on the velocity curves measured by Doppler sonography at the level of the carotid system.** A. Guell, A. Bes, L. Braak, and M. Barrere (Centre Hospitalier Universitaire Rangueil, Toulouse, France). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-25, S-26. 8 refs.

A weightlessness simulation (seven days of prolonged bedrest in an antiorthostatic position of -4 deg) was performed on four healthy human subjects. The parameters studied were the systolic time, the arterial resistance index, and the surface ratios and average velocity index which vary in the same sense as the cerebral blood flow. A significant increase was found in the systolic time from the 10th hour to the fourth day. The arterial resistance index increased during the first four days. The surface ratios and the average velocity index decreased significantly after the second hour and returned to the basal state after 48 hours. Qualitatively, a decrease was noted in the second positive wave of the sonogram, corresponding to a decrease in the arterial tonus. B.J.

**A82-40657 * # Changes in blood volume and response to vaso-active drugs in horizontally casted primates.** D. T. Dickey, K. K. Teoh, H. Sandler, and H. L. Stone (Oklakoma, University, Oklahoma City, OK). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-27, S-28. 5 refs. Grant No. NsG-2282.

Experiments were performed on horizontally casted primates (male rhesus monkeys) in order to note changes in blood volume caused by horizontal restraint, to compare orthostatic tolerance before and after casting using the responses to upright tilting, to begin to uncover the cardiovascular and neural mechanisms involved in deconditioning, and to compare the data with that obtained from bed-rested human subjects and from humans exposed to weightlessness. Bolus injections of norepinephrine of 2.0 microgram/kg, phenylephrine of 4.0 microgram/kg, and nitroprusside of 2.0 microgram/kg were administered; and aortic pressure and heart rate were recorded during the injections. The results indicate that the horizontally casted primate is a valid animal model for studying the effects of simulated zero-G on the human cardiovascular system. B.J.

**A82-40658 # Human lymphocyte activation is depressed at low-g and enhanced at high-g.** A. Cogoli, M. Valluchi, J. Reck, M. Möller (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland), W. Briegleb (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany), I. Cordt, and C. Michel (Zürich, Universität, Zurich, Switzerland). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-29, S-30. Swiss National Science Foundation Grant No. 3,109,077.

**A82-40659 * # Computer simulations of postural change, water immersion and bedrest - An integrative approach for understanding the spaceflight response.** J. I. Leonard (General Electric Co., Houston, TX), C. S. Leach, and J. A. Rummel (NASA, Johnson Space Center, Houston, TX). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-31, S-32. Contract No. NAS7-14587.

Mathematical modeling techniques were used to simulate the fluid electrolyte (F-E) responses during gravity unloading. It is shown that the response to weightlessness can best be understood by separately examining the acute (hours to days) and chronic (days to weeks) phases, and assuming the presence of normal, although complex, feedback regulatory processes. Headward shifts of fluid are shown to be primarily responsible for acute body losses of extracellular F-E. Losses of body water are closely related to the volume of fluid shifts from the legs. A diuresis is predicted within the first several hours of hypogravity, and this may be obscured by a reduced F-E intake; on Skylab, early F-E losses occurred primarily by deficit intake. B.J.

**A82-40660 # Effect of postural changes on minute ventilation, functional residual capacity and pulmonery N2 clearance.** E. U. Chae and S. H. Bae (Kyungpook National University, Taegu, Republic of Korea). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-33, S-34. 5 refs.

Respiratory responses to passive tilt were studied in anesthetized dogs that were tilted from horizontal to upright (+90 deg) and head-down (-90 deg) positions. The functional residual capacity (FRC) increased in the upright position and decreased in the head-down position. The decreased FRC was compensated by the increased minute ventilation, and an adequate percent oxygen saturation of arterial blood was maintained in the head-down position. On the other hand, in spite of increased FRC, minute ventilation was diminished and the lung clearance time was prolonged, and the percent oxygen saturation of arterial blood was decreased in the upright position. B.J.

**A82-40661 # Running in circles.** P. R. Greene and T. A. McMahon (Harvard University, Cambridge, MA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-35, S-36.

One technique for simulating the effects of enhanced gravitational acceleration on human locomotion is to have the individual run along a circular trajectory. Under these conditions, it is found that some parameters of the gait (i.e. top speed, ground contact time, and ballistic air time) change dramatically with the radius of the circle, whereas other parameters (i.e. stride frequency and step length) are essentially independent of the radius. Experimental results from 12 subjects are compared with a simple mathematical theory which assumes that the anti-gravity muscles have reached peak force. Theory and experiments agree quite well. Results are applied to the athletic question of running on a closed path, with the surprising conclusion that athletic tracks should be circular, not oval. (Author)

**A82-40662 # Cardiovascular responses to isometric exercise during simulated zero gravity.** F. Bonde-Petersen, Y. Suzuki, and T. Sadamoto (Copenhagen, University, Copenhagen, Denmark). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-37, S-38. 10 refs.

Experiments were performed on six healthy males (age 21-35 years) in order to investigate whether blood pressure reflexes during isometric exercise are related to relative muscle strength applied, and whether these reflexes are influenced by simulated weightlessness (the supine position). It is shown that knee extension has the greatest impact on cardiovascular parameters; in addition, the cardiac output showed its greatest increase to above 10 l/min during contraction. Contrary to the results of Lind et al. (1964), responses to isometric exercise at 40% MVC (maximal voluntary contraction) are found to depend on the muscle mass involved. B.J.

**A82-40663 # Effect of athletic training on physical fitness under hypodynamics.** H. Saiki, M. Nakaya, M. Sudoh, M. Abe, Y. Taketomi, and M. Naruse (Jikei University, Tokyo, Japan). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-39, S-40. 6 refs.

Twenty-nine healthy male adults were subjected to two weeks of vigorous athletic altitude training. As a result of training, such indicators as maximal oxygen uptake, flicker fusion value, and HPA reaction level, showed an increase of the physical fitness capacity; in addition, no decrease in orthostatic tolerance was observed. Water immersion exposure (six hours in head-out supine position) after training showed negative stress effects from the vantage points of the mineral and hormonal metabolisms. The results seem to indicate that an increase of physical fitness capacity, including orthostatic tolerance, can be achieved during training. B.J.

**A82-40664 * # Effect of physical training in cool and hot environments on +Gz acceleration tolerance in women.** P. J. Brock, D. Sciaraffa, and J. E. Greenleaf (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-41, S-42. 13 refs.

Acceleration tolerance, plasma volume, and maximal oxygen uptake were measured in 15 healthy women before and after submaximal isotonic exercise training periods in cool and hot environments. The women were divided on the basis of age, maximal oxygen uptake, and +Gz tolerance into three groups: a group that exercised in heat (40.6 C), a group that exercised at a lower temperature (18.7 C), and a sedentary control group that functioned in the cool environment. There was no significant change in the +Gz tolerance in any group after training, and terminal heart rates were similar within each group. It is concluded that induction of moderate acclimation responses without increases in sweat rate or resting plasma volume has no influence on +Gz acceleration tolerance in women. B.J.

**A82-40665 * # Interaction of gravitic and mechanical stimuli in tropic and nastic responses in beans.** M. J. Jaffe (Ohio University, Athens, OH). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-43, S-44. 7 refs. NASA-supported research.

Experiments designed to explore the interaction of gravity and mechanical stimuli in the tropic and nastic movements of Cherokee Bush bean plants were summarized. When 10-day-old plants were rubbed just prior to presentation of the gravitic stimulus (by placing them on their sides), they displayed much less geotropic curvature than did nonrubbed controls. Geotropism could also be inhibited by rubbing even after it had been progressing for two hours. Wind from a fan could also inhibit geotropism, suggesting that this phenomenon also occurs in nature. P.J.

**A82-40666 * # Morphogenesis of a higher plant from cultured cells and embryos in space.** A. D. Krikorian, F. R. Dutcher, C. E. Quinn, and F. C. Steward (New York, State University, Stony Brook, NY). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-45, S-46. Grant No. NsG-7270; Contract No. NAS2-10150.

Reference is made to the Cosmos 782 experiment, which showed that cultured totipotent cells of carrot can give rise to embryos with well-developed roots but minimally developed shoots at near-zero g. The problem of whether the development of leafy shoots is sensitive to near-zero g conditions is considered. A test system that would allow this problem to be resolved in a future space flight is described. C.R.

**A82-40667 # Gravity sensing, polar transport and cytoplasmic streaming in plant cells.** J. O. Kessler (Arizona, University, Tucson, AZ). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-47, S-48. 5 refs.

**A82-40668 * # Receptors signaling gravity orientation in an insect.** H. B. Hartman (Texas Tech University, Lubbock, TX). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-49, S-50. 6 refs. NSF-supported research; Grant No. NsG-7435.

Displacement in any direction from primary orientation is found to evoke tonic activity from at least one of the four interneurons of a certain type of burrowing cockroach; the receptive field for each interneuron is slightly more than a quadrant. The receptive field of each interneuron is found to be the same as the row of receptors providing the input. Displacement about the least stable axis (0-180 deg) or roll, on the one hand, and the most stable axis (90-270 deg) or pitch, on the other, is found to be unambiguously signaled by pairs of interneurons. Indications are obtained that receptors in the lateral row drive a giant interneuron in a contralateral connective and those in the medial row drive one in an ipsilateral connective. C.R.

**A82-40669 * # Bone growth and composition in weanling and mature rats exposed to chronic centrifugation.** L. C. Keil (NASA, Ames Research Center, Moffett Field, CA) and J. W. Evans (California, University, Davis, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-53, S-54. 8 refs.

The primary objective of the study is to determine the effect of continuous exposure to hypergravity on the development and composition of weight-bearing bone. The experimental results are seen to suggest that many, if not all, of the changes observed in bone growth and composition derive from the retarded growth rate of the centrifuged rats. Both centrifuged weanling and mature rats exhibit a significant reduction in femur length and mass. The changes in femur size are more apparent in the weanlings since they are exposed to hypergravity during their most rapid phase of skeletal development. In addition to a slower growth rate, the body mass of the mature and weanling animals is reduced even further by the depletion of body fat. The rapid loss of body fat observed in rats and mice during centrifugation, it is found, can produce a prompt and significant rise in relative femur mass after two weeks of exposure. After adaptation to centrifugation, however, relative femur mass is similar to that of controls at four and eight weeks. At 18 weeks, the centrifuged rats again exhibit an increase in relative femur mass. It is thought that this increase in relative femur mass may be generated by the difference in fat deposition between the 1-G controls and the high-G rats. C.R.

**A82-40670 * # Cardiovascular responses of the chronically instrumented monkey during simulated space flight.** E. P. McCutcheon, E. Carlson, R. C. Mains, N. Pace, D. F. Rahlmann, and H. Sandler (NASA, Ames Research Center, Biomedical Research Div., Moffett Field; California, University, Berkeley, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-55, S-56.

A pod enclosure system designed by the Environmental Physiology Laboratory at the University of California at Berkeley is found to be eminently suitable for work with monkeys. The pattern of cardiovascular activity is found to vary. In the first half of the exposure, the hourly mean values suggest an initial period of instability, most marked for heart rate, beginning at 'launch.' In the second half of the exposure, the final three days, the responses appear much more ordered, with a stable phase relationship between circadian shifts in heart rate and mean aortic pressure. Since the latter stability is more normal, the assumption is made that the animal had become adjusted to its situation. Imposition of a daily lower body negative pressure (LBNP) stress shows characteristic responses. C.R.

**A82-40671 * # Centrifuge high-g effects on temperature regulation in unanesthetized rats.** J. M. Horowitz, E. R. Schertel, and B. A. Horwitz (California, University, Davis, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-57, S-58. Grant No. NsG-2234.

**A82-40672 # Effects of high-G on ventilation/perfusion in the domestic fowl.** S. C. Walgenbach, R. E. Burger, and A. H. Smith (California, University, Davis, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-59, S-60. 7 refs. Grant No. AF-AFOSR-77-3430.

**A82-40673 * # Dynamics of weight loss during prolonged spaceflight.** C. S. Leach (NASA, Johnson Space Center, Houston, TX), J. I. Leonard (General Electric Co., Houston, TX), and P. C. Rambaut (NASA, Washington, DC). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-61, S-62. 6 refs.

Data from three Skylab flights lasting 28, 59, and 84 days are used to study changes in body composition occurring during extended spaceflight. The analysis includes pre- and postflight measurements used to compute lean body mass and body fat losses for an entire mission using previously accepted methods based on total body water, potassium, and density, and also includes the daily metabolic balances in order to provide an estimate of the time course of the changes in water, protein, and fat. The analytical approach is explained and the results presented, including a summary of changes in lean body mass and changes in weight loss and tissue components. It is concluded that little more than half of the weight loss observed during the missions can be attributed to loss in lean body mass, the remainder being derived from fat stores. C.D.

**A82-40674 * # Otoconial complexes as ion reservoirs in endolymph.** M. D. Ross and T. J. Williams (Michigan, University, Ann Arbor, MI). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-63, S-64. 5 refs. Grant No. NsG-9047.

Scintillation spectrometry was employed to examine the Ca-45(2+) uptake and exchange by otoconial complexes in the sensory region endolymph medium, and a comparison was made with bone mineral deposition. CaCl was injected intraperitoneally into 222 rats and blood samples were collected at set intervals during the subsequent 15 min-l mo life durations of the animals. The animals were eventually sacrificed and saccular and utricular otoconial complexes were microdissected while bone chips from the otic bone and femur were gathered by scraping. Ca-45 was present in the saccular otoconial complexes within 15 min of injection, an uptake similar to the bone deposition, while slower rates were observed with the utricular complexes. Utricular uptake, however, accelerated 5-6 hr postinjection, and total otoconial content was always lower than proportional bone absorption. M.S.K.

**A82-40675 # Effect of baroreceptor denervation on +G sub z tolerance in dogs.** D. F. Peterson (Oral Roberts University, Tulsa, OK) and V. S. Bishop (Texas, University, San Antonio, TX). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-65, S-66. Grant No. AF-AFOSR-73-2525.

**A82-40676 # The effects of +G2 acceleration stress on right ventricular pressures in conscious miniature swine..** M. H. Laughlin and J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-67, S-68.

The effects of various levels of g-stress due to acceleration were examined on five young female miniature swine. Physiological parameters were monitored by means of catheters inserted in the cranial vena cava and outfitted with pressure transducers which were moved into the right ventricular chamber when the animals were placed in a centrifuge. Sample pressures were taken during rest, and during and after 30 sec exposures to 1-9 g integer increments of stress. Increases were observed in mean right ventricular systolic pressure, torr/sec, and heart during acceleration. The highest mean right ventricular diastolic pressure increase occurred at 5 g, while the pressure peaked at 3 g. It is concluded that acceleration induced a reflex increase in sympathetic tone to the heart, affected the mechanical processes of the lungs, and increased pulmonary vascular resistance. M.S.K.

**A82-40677 * # Effect of simulated weightlessness on energy metabolism in the rat.** J. P. Jordan, H. A. Sykes, J. C. Crownover, C. L. Schatte, J. B. Simmons, II, and D. P. Jordan (Colorado State University, Fort Collins, CO). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-69, S-70. Grant No. NsG-2232.

Results of measurements of food uptake and body weight changes occurring in rats suspended from a harness so that the antigravity muscles were not used for locomotion are presented. The rats were tested in pairs, with both in a harness but only one suspended off its hind legs; this section lasted 7 days. A second phase of the experiment involved feeding the nonsuspended rat the same amount of food the experimental rat had consumed the previous day. All rats experienced decreased in body weight and food intake in the first stage, while in the second stage the suspended rat lost more weight. The total oxygen uptake, CO2 output, and rate of C-14O2 production were depressed in the suspended rats, then returned to normal levels once the rats were back on thyground. It is concluded that the gross metabolic processes are unaffected by simulated weightlessness. M.S.K.

**A82-40678 # Gravity, metabolic rate and body size of mammals.** A. C. Economos (San Jose State University, San Jose, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-71, S-72. 10 refs.

The discrepancy of mammalian basal metabolic rate allometry from the theoretically plausible 'surface law' is studied from the perspective of response to experimentally induced hypergravity. Gravitational tolerance, 'rate' of repression of growth, and basal metabolic rate as a function of body mass are determined for a variety of animals. It is shown that gravitational tolerance obeys a power law, which is also found for repression of growth in hypergravity. C.D.

**A82-40679 * # Altered bone turnover during spaceflight.** R. T. Turner, E. R. Morey, C. Liu, and D. J. Baylink (U.S. Veterans Administration Medical Center, Tacoma, WA; NASA, Ames Research Center, Moffett Field, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-73, S-74. 5 refs.

Modifications in calcium metabolism during spaceflight were studied, using parameters that reflect bone turnover. Bone formation rate, medullary area, bone length, bone density, pore size distribution, and differential bone cell number were evaluated in growing rate both immediately after and 25 days after orbital spaceflights aboard the Soviet biological satellites Cosmos 782 and 936. The primary effect of space flight on bone turnover was a reversible inhibition of bone formation at the periosteal surface. A simultaneous increase in the length of the periosteal arrest line suggests that bone formation ceased along corresponding portions of that surface. Possible reasons include increased secretion of glucocorticoids and mechanical unloading of the skeleton due to near-weightlessness, while starvation and immobilization are excluded as causes. C.D.

**A82-40680 * #** **Effect of space flight on bone strength.** D. M. Spengler, E. R. Morey, D. R. Carter, R. T. Turner, and D. J. Baylink (NASA, Ames Research Center, Moffett Field, CA; U.S. Veterans Administration Medical Center, Tacoma, WA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-75, S-76. 6 refs.

To test the possibility that spaceflight has a deleterious effect on bone mechanical properties, femur breaking strength by torsional loading in rats that had been flown for 19 days aboard Cosmos 936 was determined. The results showed that femurs from flight rats were less stiff than the flight controls, and failed under torsion at a lower torque and energy of absorption. The defect was corrected following space flight and could be prevented during space flight by centrifuging the rats at 1 x g. Altered bone geometry due to inhibition of bone formation at the periosteal surface provides the most likely explanation for the decrease in bone strength during spaceflight. C.D.

**A82-40681 #** **The effect of G sub z acceleration on pulmonary perfusion in the miniature swine.** J. E. Whinnery and M. H. Laughlin (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-77, S-78.

**A82-40682 * #** **Influences of horizontal hypokinesia on performance and circadian physiological rhythms in female humans.** C. M. Winget, C. W. DeRoshia, and H. Sandler (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-79, S-80. 5 refs.

Eight females from 35-45 yr of age were subjected to seven days of ambulatory control, seven days of bed rest, and a five day recovery period, with 30 min of centrifugation on day seven of bedrest to determine the effects of weightlessness on the circadian rhythms of females in that age group. Heart rate and rectal temperature (RT) were monitored and each subject was tested in a flight simulator twice a day in conditions of varying levels of turbulence. The flight simulations were run during the morning and acrophase of the circadian RT and performance errors wery monitored for 6 min. No significant differences were detected in the group performance data pre-, during, and post-bedrest, although better performance in the simulator was observed after the centrifuge exposure. An RT phase shift was statistically significant between pre- and during bedrest stages. M.S.K.

**A82-40683 * #** **Instantaneous stroke volume in man during lower body negative pressure /LBNP/.** J. A. Loeppky, K. L. Richards, E. R. Greene, M. W. Eldridge, D. E. Hoekenga, M. D. Venters, and U. C. Luft (Lovelace Foundation for Medical Education and Research; U.S. Veterans Administration Medical Center, Albuquerque, NM). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-81, S-82. 6 refs. Contract No. NAS9-15483.

Results of an examination of the instantaneous time course of the stroke volume (SV) and cardiac output (Q) in response to the onset and release of -50 torr lower body negative pressure (LBNP) are reported. Six male subjects were sealed into a LBNP box up to the iliac crest while being monitored by echocardiograph for centerlamina blood velocity, fluid displacement, stroke volume, heart rate, and leg volume. Particular use was made of pulsed ultrasonic Doppler velocity meters for measuring the blood velocities and flow dynamics. Measurements were made of the subjects continuously beginning from 20 sec prior to and one min after LBNP onset and release. A linear fall in the SV was observed with LBNP at 49% of the baseline value after 33 sec. A 62% drop, the lowest, was detected after 8 min of LBNP. The leg volume was inversely related to Q for the duration of the experiment. M.S.K.

**A82-40684 #** **Ultra-high impact free-fall survival.** R. G. Snyder (Michigan, University, Ann Arbor, MI). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-83, S-84. 11 refs.

Results of a survey of recorded literature empirically defining the lethal limits of stopping time afte;free fall are reported. The studies covered impacts on a variety of surfaces, including water, snow, ice, concrete, etc. A decisive factor in the survival after impact following free-fall was determined to be the distribution of the force. Cleaving water by head-first or feet-first entrance was found to have prevented death after terminal speeds of 97 and 116 ft/sec. Cases are cited, however, of suicide attempts from jumping off five and six story buildings, where the individuals received only minor injuries, and actually were ambulatory after the impact. It is suggested that if the time duration of an abrupt impact decreases below 600 microsec, levels of impact forces may be withstood which in other conditions would be lethal. M.S.K.

**A82-40685 #** **Simulated gravitational field influences on the aging process.** A. Vrabiescu (National Institute of Gerontology and Geriatrics, Bucharest, Rumania). *Physiologist, Supplement*, vol. 22, Dec. 1979 (1982), p. S-85, S-86. 7 refs.

Results of experiments on 97 rats to assay the influence of gravity on aging process are reported. Three groups experienced 1, 2, and 5 g's each for period of at least 473 days in a centrifugal device. Growth, skin condition, hair, nails, behavior, memory, O2 consumption, body temperature, ECG, peripheral blood cytomorphology, morbidity, and mortality were evaluated in all the animals, with 6-10 rats from parallel groups also undergoing autopsy for morphological examination of internal organs and the biological age of collagen. Rats exposed to higher accelerations experienced growth slowdown 30-90 days earlier than the normal gravity rats. Symptoms such as arthrosis, osteoporosis, and decalcification, all indicative of advanced age, were also present in the rats exposed to two and five g acceleration after several months. Accelerated collagen aging was evident in the rats enduring 5 g's, as were neuro-endocrine reactions suggestive of stress. M.S.K.

**A82-40686** **International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980, Proceedings.** Physiologist, Supplement, *vol. 23, Dec. 1980 (1982). 159 p.*

The Proceedings of the Second Annual Meeting of the IUPS Commission on Gravitational Physiology are presented. Papers are presented on the effects of gravity and weightlessness on the physiology of humans and other animals, both during space flights and in simulation experiments. Topics discussed include the adaptation of animals to changed gravity; metabolic and morphological studies of physiological systems during conditions of changed gravity; the function and structure of the gravity-dependent systems, such as the vestibular, bone, and muscle systems; hypokinesia and immobilization; as well as various other aspects of gravitational physiology. N.B.

**A82-40687 #** **Aspects of cardiovascular adaptation to gravitational stresses.** F. Bonde-Petersen, N. J. Christensen, O. Henriksen, B. Nielsen, C. Nielsen, P. Norsk, L. B. Rowell, T. Sadamoto, G. Sjogaard, and K. Skagen (Copenhagen, University, Copenhagen, Denmark). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-7 to S-10. 10 refs. Research supported by the Danish Space Council, and Statens Laegevidenskabelige Forskningsrad.

Conditions of gravitational stress were studied in humans during exercise, both dynamic and static. The subjects were exposed to high and low gravity conditions, simulated by a variety of methods, including lower body negative and positive pressures, bed rest, and water immersion. Dynamic exercise tests were conducted on bicycle ergometers. Various parameters were measured, including cardiac output (CO), mean arterial blood pressure, heart rate, and skin blood flow. Blood samples were analyzed for proteins, hemoglobin, colloid osmotic pressure, etc. Among other results, it was found that plasma volume decreases during studies lasting six hours. The adaptation of CO, which first was increased by up to 60%, was more rapid as CO was gradually recovering during the first two hr. However, the decrease in forearm vascular resistance, which was observed immediately at the onset of head-out water immersion, persisted during the experiment. During exercise, static and dynamic water immersion to the xiphoid level produced greater changes than during the control situation. In addition, local hydrostatic forces elicit vascular reflexes, which can be dominated by the general sympathetic nervous activity evoked during lower body negative pressure. N.B.

**A82-40688 #** **Adaptation to weightlessness and its physiological mechanisms - Results of animal experiments aboard biosatellites.** O. G. Gazenko, A. M. Genin, E. A. Il'in, V. S. Oganov, and L. V. Serova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-11 to S-15. 47 refs.

Results of experiments on mammals aboard several Cosmos biological satellites are reviewed. These experiments were conducted to investigate the patterns of adaptation of higher animals to weightlessness, to study the physiological and morphobiochemical characteristics of organs and tissues of weightless animals, and to explore their readaptation to earth's gravity after exposure to zero-g. Results of these biosatellite experiments demonstrated certain patterns of adaptation of animals to weightlessness. For example, a relatively prolonged exposure to weightlessness did not cause pathological changes in the structure of any of the organs tested. The changes observed in the hypothalamus-hypothysis-adrenal system, muscles, bones, myocardium, and other organs proved reversible, returning to normal by 25 days after the flights. Certain experiments suggest that the space flight-induced stress reaction remains at a moderate level throughout the flight. Among other results, the studies provided information about structural and metabolic changes in muscles and bones, which were found to be similar to the changes seen in ground-based simulation experiments (hypokinesia and hypodynamia). N.B.

**A82-40689 # Physiological mechanisms of adaptation of rat skeletal muscles to weightlessness and similer functional requirements.** V. S. Oganov, S. A. Skuratova, A. N. Potapov, and M. A. Shirvinskaia (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-16 to S-21. 34 refs.

Investigations of the mechanisms of functional atrophy in skeletal muscles, such as muscle mass loss, and the decline of muscle tone, strength, and endurance, which occurs during long periods of weightlessness were conducted on rats aboard Cosmos biosatellites and in ground-based simulated weightlessness studies. It was observed that the soleus and extensor digitorum longus muscles showed a decrease of muscle contraction strength upon their tetanic stimulation, loss of elasticity, and a decline of tolerance to fatigue. In addition, the soleus muscle displayed a selective acceleration of tetanus development and a decrease of the amplitude of the twitch/tetanic tension ratio. A decrease in the maximum amplitude of isometric tension (Pm) was observed in the slow soleus muscle and, to a lesser extent, in the medial head of the triceps brachii muscle. Hypokinetic experiments did not reveal significant changes of Pm in glycerinated fibers of any fore- or hind-limb muscle tested. Hypodynamic studies demonstrated a decrease in strength and a shortening of the time of tetanus development in the intact medial head of the triceps brachii muscle. N.B.

**A82-40690 # Weightlessness effects on resistance and reactivity of animals.** L. V. Serova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-22 to S-26. 10 refs.

Studies of bodily resistance and reactivity in rats during weightless conditions were conducted aboard several Cosmos biosatellites during flights lasting 18.5-22 days (approximately 1/50 of the lifespan of the animals). It was observed that both catabolic and anabolic processes were activated, the thymus and spleen weights decreased, and the thymocyte and splenocyte counts we reduced. In addition, the animals exhibited lumphopenia in the blood and a decrease in the percentage content of lymphocytes in the bone marrow. Stress tests showed that the animals exposed to weightless conditions largely retained their ability for adequate reactions of blood cells to additional stressors, in spite of the fact that the intial (postflight-pretest) blood of flight animals differed significantly from that of control animals. It is concluded that an 18-22 day exposure to weightlessness reduces resistance of the animal body, although this reduction is not great and exerts no significant effect on animal viability. N.B.

**A82-40691 # Artificial gravity in space flight.** A. R. Kotovskaia, E. A. Il'in, V. I. Korolkov, and A. A. Shipov (Ministerstvo Zdravookhraneniia SSSR, Insitut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-27 to S-29. 5 refs.

The biomedical effects of artificial gravity generated by spacecraft rotation on rats was investigated during a 19.5 day space flight, and compared to the effects caused by weightlessness. An artificial gravity of 1 g generated inflight helped to prevent to a large degree the development of weightlessness-induced adverse changes in the animals. Artificial gravity normalized the effects of weightlessness on the functions of the myocardium, skeletal muscule system, and the excretory system. However, specific effects caused by the rotation were also observed, including functions realized through the combined action of the optic, vestibular, and motor sensors (equilibrium function, turning reflex, orientation in a maze, higher motor control). N.B.

**A82-40692 # Biorhythms of rats during and after space flight.** V. Ia. Klimovitskii, E. A. Il'in, V. S. Oganov, G. G. Shlyk, V. V. Verigo (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), K. Hecht, M. Poppei, T. Schlegel, E. Wahtel, and D. Zass (Berlin, Humboldt Universität, Berlin, East Germany). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-30 to S-33. 9 refs.

The influence of weightlessness, confinement, and the remoteness of natural terrestrial time cues on biorhythms in rats was investigated both during and after space flights on Cosmos satellites. Results showed that weightlessness did not exert an adverse effect on the formation and stability of circadian rhythms of rats in-flight. The rate with which the phase of the circadian rhythm of motor activity and body temperature drifted after a day-night inversion was normal. It was suggested that weightlessness, being an additional stressor that was absent in the synchronous animals, somehow helped t accentuate circadian rhythmicity. After flight and synchronous experiments, the circadian and minute rhythms changed in both animal groups, although these experiments were completed during the phase drift which continued after day-night inversion. However, the physiological loads associated with the adaptation to weightlessness and readaptation to 1 g upon return to earth of flight animals were responsible for more stable changes in their biorhythms than for synchronous rats. N.B.

**A82-40693 # Rhythms of electrolytes and hydroxyproline excretion in urine of rats after three weeks of weightlessness - Biosatellite Cosmos-1129.** K. Kwarecki, H. Debiec, and Z. Koter (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-34 to S-37. 14 refs.

Investigations were carried out on rats subjected to a 180 deg light-dark phase shift within 10 days of spaceflight. On the third, eighth and thirteenth day after landing the following rhythms were determined: urine volume, excretion of sodium, potassium, calcium, phosphate and hydroxyproline with urine. All rhythms studied in the urine in control groups were synchronized within 13 days after being subjected to the inverted lighting schedule. In postflight animals the circadian rhythms of diuresis, sodium and potassium excretion with urine were synchronized to the new lighting regimen whereas the other variables were not phase-shifted even within 23 days period. The results suggest that the synchronizing effect of the light-dark cycle under space conditions was weakened. (Author)

**A82-40694 # Ultrastructural qualitative and quantitative evaluation of cytoplasmatic structures of heart muscle of rats living aboard biosputnik Kosmos 936.** S. Baranski, M. Kujawa, and A. Kaplanskii (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-38 to S-40. 8 refs.

Ultrastructural morphometrical examinations of some cytoplasmatic structures from heart muscle of rats flight on board of the biosatellite Cosmos 936 were carried out. Two groups of animals were examined; one living in weightlessness conditions and the second in weightlessness with artificial, centrifuge-induced gravity. In both groups of animals the following was observed; changes in the structure of mitochondrial and smooth endoplasmatic reticulum and miofilaments. Artificial gravity does not prevent changes in rat heart muscle. (Author)

**A82-40695 # Body composition of rats flown aboard Cosmos-1129.** A. S. Ushakov, T. A. Smirnova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), G. C. Pitts (Virginia, University, Charlottesville, VA), N. Pace, A. H. Smith, and D. F. Rahlmann (California, University, Berkeley and Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-41 to S-44. 9 refs.
(Previously announced in STAR as N82-20832)

**A82-40696 # Stress in space flight - Metabolic aspects.** R. A. Tigranian, L. Macho, R. Kvetnansky, S. Nemeth, and N. F. Kalita (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR: Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-45 to S-50. 25 refs.

In order to identify the stress reaction associated with a prolonged exposure to weightlessness, various stress indicators (such as the concentration of catecholamines; the activities of enzymes involved in adrenal, hypothalamus, myocardium, and blood metabolism; the hormone content in blood; and the enzyme activity in the liver) were investigated in different organs and tissues of rats flown for 18.5 days aboard a Cosmos biosatellite. The results obtained were compared to data from rats exposed to the effects of artificial gravity generated by a centrifuge on the biosatellite, as well as from vivarium controls. It was concluded that the space flight was not a powerful stressor for the sympatho-adrenal system. An increase in the activities of aspartate aminotranferase, alanine aminotransferase, fructose-1,6-diphosphatase, and gluocose-6-phosphatase was the only convincing evidence of weightlessness-induced chronic stress to which the rats were exposed throughout the flight. Thus, this study demonstrated a good adaptation of animals to prolonged weightlessness alone and to space flight effects on the whole. N.B.

**A82-40697 # Results of morphological investigations aboard biosatellites Cosmos.** A. S. Kaplanskii, E. A. Savina, V. V. Portugalov, E. I. Il'ina-Kakueva, E. I. Alekseev, G. N. Durnova, A. S. Pankova, G. I. Plakhuta-Plakutina, V. N. Shvets, and V. I. Yakovleva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-51 to S-54. 20 refs.

A review is presented of morphological studies, conducted on Cosmos biosatellites, designed to identify the systems and organs showing reactions to weightlessness and to determine the pattern, specificity, and reversibility of changes induced. Results of these studies show that the direct effect of weightlessness causes inhibition of bone growth, resorption and demineralization of bone tissues, functional atrophy of muscles, depletion of a portion of the capillaries in muscles, inhibition of erythropoiesis and thrombocytopoiesis, and the appearance of morphological signs of a decreased functioning of certain components of the neuroendocrine system. A stress reaction during weightlessness results in the involution of lymphoid organs. It is concluded that all morphological effects of weightlessness are directly or indirectly associated with a diminished functioning of different organs and systems, and reflect the adaptation of the animal body to a new environment. N.B.

**A82-40698 * #** **Studies of specific hepatic enzymes involved in the conversion of carbohydrates to lipids in rats exposed to prolonged spaceflight aboard Cosmos 1129.** S. Abraham, C. Y. Lin (Children's Hospital Medical Center, Oakland, CA), H. P. Klein, C. Volkmann (NASA, Ames Research Center, Moffett Field, CA), R. A. Tigranian, and E. G. Vetrova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-55 to S-58. 6 refs.
(Previously announced in STAR as N81-32831)

**A82-40699 #** **Effect of prolonged weightlessness on certain aspects of brain metabolism of the rat.** N. N. Demin, O. G. Gazenko, and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-59 to S-62.

The effect of relatively long periods of weightlessness on the metabolism of the central nervous system was studied in rats aboard several Cosmos biosatellites. Results showed that during stable adaptation to space flight conditions, cerebral metabolism was slightly inhibited, as expressed in the brain segments associated with motor activity. The decline in the absolute content of RNA and the normal content of proteins in Purkinje cells suggested that the level of protein metabolism in these neurons was lowered. This was also indicated by a decrease in the activities of acetylcholinesterase and cholinesterase. In the motor lobe, the content of thiol groups as well as cholinesterase activity decreased, perhaps reflecting an inhibition of central structures. In general, the changes identified are suggestive of a passive suppression of the functional activity of the brain, rather than manifestations of stress reactions. N.B.

**A82-40700 #** **Effect of spaceflight on lymphocyte stimulation.** A. Cogoli and A. Tschopp (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-63 to S-66. 14 refs. Swiss National Science Foundation *Grant No. 3,499,0,79.*

A review is presented of experiments on human lymphocytes performed either during space flights or at high-g and simulated low-g conditions in order to test the efficiency of the specific immune system during and after space flight. Results show that low-g conditions depress the activity of lymphocytes, whereas high-g conditions have a stimulating effect. Although no mechansim of activation is proposed, a number of effects are possible, including changes in the distribution of organelles induced by gravity or weightlessness which change the concentration of molecules involved in lymphocyte activation. In addition, the observed effect of gravity on the rate of lymphocyte activation suggests that a not-yet-identified biological clock in lymphocytes could be regulated by gravity. N.B.

**A82-40701 #** **Study of contractile properties and composition of myofibrillar proteins of skeletal muscles in the Cosmos-1129 experiment.** T. Szilagyi, A. Szoor, O. Takacs, M. Rapcsak, V. S. Oganov, S. A. Skuratova, S. S. Oganesian, L. M. Murashko, and M. A. Eloian (Debreceni Orvostudomanyi Egyetem, Debrecen; Szegedi Orvostudomanyi Egyetem, Szeged, Hungary; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR; Institute of Cardiology, Yerevan, Armenian SSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-67 to S-70. 14 refs.

The influence of weightlessness on the soleus, extensor digitorum longus, triceps, and brachial muscles was investigated in rats flown for 18.5 days aboard a Cosmos biosatellite. Results suggest that the changes in the muscles due to weightlessness depend on the functional properties of the muscles, although all of the muscles studied showed a great decrease in weight and contractile properties. The most sensitive reaction was displayed by the soleus muscle, which predominantly consists of slow fibers. Gel electrophoresis studies revealed an increase in the quantity of LC-3 fast myosin subunits in the soleus and extensor digitorum muscles, indicating that a transformation of the muscles takes place under conditions of weightlessness. Recovery experiments demonstrated that the soleus and brachial muscles showed significant change on the sixth day, whereas on the 29th day readaptation was complete. In addition, plaster cast immobilization studies were found to serve as a good model for the simulation of the effects of weightlessness. N.B.

**A82-40702 #** **Variability of physiological properties of rat skeletal muscles at different gravity levels.** V. S. Oganov, A. N. Potapov, S. A. Skuratova, and M. A. Shirvinskaia (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-71 to S-75. 26 refs.

Changes in the physiological parameters of skeletal muscles of rats exposed to weightlessness and to artificial gravity both in terrestrial and space flight conditions were investigated. Hindlimb muscles exhibited a significant decrease of maximal amplitude of isometric tension, especially in the soleus muscle, in the absence of significant changes in the contraction strength of the extensor digitorium longus muscle. Studies of the forelimb muscles suggested that the final result of weightlessness on the triceps muscle is very similar to the reaction of the antigravity soleus muscle. The response of the brachial muscle to space flight includes a more marked 'training' effect, which is manifested as an increased maximal amplitude of isometric tension. These experimental findings give evidence that the reactions of the contraction system of different muscle due to an altered gravity are strongly dependent on their functional specialization and the biomechanics of their contraction. N.B.

**A82-40703 * #** **Morphometric analysis of rat muscle fibers following space flight and hypogravity.** L. A. Chui (Southern California, University, Los Angeles, CA) and K. R. Castleman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-76 to S-78. 10 refs. NASA-supported research.

The effect of hypogravity on striate muscles, containing both fast twitch glycolytic and slow twitch oxidative fibers, was studied in rats aboard two Cosmos biosatellites. Results of a computer-assisted image analysis of extensor digitorum muscles from five rats, exposed to 18.5 days of hypogravity and processed for the alkaline ATPase reaction, showed a reduction of the mean fiber diameter (41.32 + or - 0.55 microns), compared to synchronous (46.32 + or - 0.55 microns) and vivarium (49 + or - 0.5 microns) controls. A further experiment studied the ratio of fast to slow twitch fibers in 25 rats exposed to 18.5 days of hypogravity and analyzed at four different periods of recovery following the space flight. Using the previous techniques, the gastrocnemius muscle showed a reduction of the total muscle fiber area in square microns and a reduction in the percentage of slow fibers of flight animals compared to the control animals. N.B.

**A82-40704 * #** **Bone resorption and calcium absorption in rats during spaceflight.** C. E. Cann, R. R. Adachi, and E. Morey Holton (NASA, Ames Research Center, Biomedical Research Div., Moffett Field; California, University, San Francisco, CA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-83 to S-86. 7 refs.
(Previously announced in STAR as N81-32845)

**A82-40705 #** **Bone growth in the rat mandible during space flight.** D. J. Simmons, J. E. Russell, F. Winter, W. Walker (Washington University, St. Louis, MO), A. Vignery, Mr. Tran Van Thuc (Yale University, New Haven, CT), G. D. Rosenberg (Indiana University; Purdue University, Indianapolis, IN), and R. Baron. *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-87 to S-90. 8 refs.
(Previously announced in STAR as N81-32839)

**A82-40706 * #** **A new rat model for studies of hypokinesia and antiorthostasis.** X. J. Musacchia and D. R. Deavers (Louisville, University, Louisville, KY). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-91, S-92. 12 refs. Grants No. NsG-2191; No. NsG-2325.

A new rat model (suspension and immobilization) is described for induction of hypokinesia and orthostatic manipulations. Hypokinetic responses were comparable to those in prolonged bed rest and weightlessness in humans, body or limb casted and small cage restrained animals. Responses to antiorthostasis (15 to 20 deg head down tilt) in rats were similar to those in neutral bouyancy tests in humans and animals and to those in prolonged bed rest in humans. During seven days of hypokinesia there was an atrophy of the gastrocnemius and increased excretion of urinary nitrogeneous end products. The antiorthostatic (AOH) 15 to 20 deg head down tilt resulted in diuresis, natriuresis and kaliuresis. No comparable responses were observed in orthostatic hypokinetic (OH) rats. Readaptation from AOH and OH occurred during one week recovery in metabolic cage conditions. (Author)

**A82-40707 #** **Na/+/-K/+/ dependent ATP-ase modifications of skeletal muscle and myocardium of hypokinetic rats.** P. Groza, S. Cananau, D. Ungureanu, A. Petrescu, and C. T. Dragomir (Academia de Stiinte Medicale, Bucharest, Rumania). *(International Union of Physiological Sciences, Annual*

*Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-93, S-94. 8 refs.

Membrane ionic transfer in skeletal and cardiac muscles was studied in rats exposed to 15, 30, and 60 days of hypokinesia by determining the Na(+)-K(+) dependent ATPase membrane activity. Electron microscopy showed that both types of muscles were modified after hypokinesia, and mitrochondrial alteration and atrophy of the myofibrils were also observed. The changes in the myocardium were more marked, due to a decreased metabolic rate based on a diminished oxygen need and use and a functional deficiency. Na(+)-K(+) dependent ATPase activity diminished with a lengthening of the time of hypokinesia. In the myocardium, the decrease in the activity of this enzyme was more pronounced, as well as more rapid, than in the soleus muscle, thus demonstrating a greater functional lability of this muscle. The intracellular content of Na(+) increased, while that of K(+) decreased, which can be explained as the consequence of structural modifications and alterations of the complex ATPase membrane system which ensures the Na(+) and K(+) extracellular and intracellular distribution and polarization. N.B.

**A82-40708 # Effect of immobilization on the ATPase activities and Ca-uptake of sarcoplasmic reticulum in different types of muscles.** G. Jakab, L. Gajdos, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-95, S-96. 7 refs.

The effect of immobilization on the activity of ATPase calcium ion uptake is studied in sacroplasmic reticulum vesicles isolated from rabbit gastrocnemius and soleus muscles. The changes in the 'extra' Ca(2+) ATPase activity of normal and immobilized muscles are examined in order to study the Ca transport system. Results show that the 'extra' Ca(2+) ATPase activity increases about two-fold in the gastrocnemius muscle and about five-fold in the soleus muscle in comparison with the controls after two weeks of immobilization. The calcium ion uptake capacity values in both types of muscles are the highest after two weeks of immobilization, increasing three-fold in the gastrocnemius muscle and four-fold in the soleus muscle. It is concluded that immobilization has a strong effect on the calcium metabolism of the fibers, in which the muscles adapt to new situations by establishing a new steady state. N.B.

**A82-40709 # Plasticity of fast and slow muscle myofibrillar proteins in model experiments simulating weightlessness.** M. G. Meszaros, O. Takacs, J. Hideg, E. Berenyi, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged; Hungarian People's Army, Medical Corps., Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-97, S-98.

Plaster cast immobilization seems to be an adequate method for simulating the effect of weightlessness on muscles under terrestrial conditions. Therefore, the protein composition of myofibrils from fast and slow muscles of rabbit hind limbs immobilized by plaster cast was analyzed using one- and two-dimensional gel-electrophoretic techniques. It was demonstrated that the response of structural elements from functionally different muscles on the altered demands manifests itself in a fading of isomyosin pattern characteristic of fast and/or slow contractile properties. In the fast muscle the quantity of homodimeric LC-3 isomyosin decreases, while increases in the slow one. This results in a transformation of the myosin population, consequently a de-differentiation of muscle cells. The changes will be discussed in the term of plasticity of vertebrate striated muscles. (Author)

**A82-40710 # Effect of immobilization of the excitatory parameters of different type skeletal muscle.** A. Torok, I. Sziklai, O. Takacs, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-99, S-100.

The effect of immobilization on the physiological functions of rabbit skeletal muscles is investigated. Results indicate that the latency time, which may be regarded as one of the excitation parameters, increases in immobilized muscles, and may be related to the effect of disuse. The twitching amplitude of the gastrocnemius muscle does not change with disuse, while it decreases by about 50% in the soleus muscle, and these values are found to be parallel to the decrease of myofibrillar protein content. More importantly, it is determined that the half-time of tension development and the half-time of relaxation for the soleus muscle are equivalent to the values found for the gastrocnemius muscle as a result of disuse. It is concluded that disuse leads to the dedifferentiation of muscles with different functions. N.B.

**A82-40711 # Effect of immobilization on the nonhistone protein composition in different types of skeletal muscles.** I. Sziklai, O. Takacs, Z. Kiss, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-101, S-102.

Nonhistone proteins of fast-twitch glycolytic head of the gastrocnemius muscle and slow-twitch oxydative soleus muscle of rabbit were extracted and analyzed by two-dimensional gel electrophoresis in normal stages and after two weeks of disuse. The ratio of the quantities of nonhistone chromosomal proteins to DNA was nearly standard in soleus muscle: 1.21 (normal), 1.29 (disused); and decreased in gastrocnemius muscle: 2.66 (normal), 2.26 (disused). After disuse, besides the basically unchanged nonhistone patterns, there was a disappearance of the low mol. weight spots in the soleus muscle while new polypeptides emerged in the same range in the gastrocnemius muscle. (Author)

**A82-40712 # Immobilization effects upon aerobic and anaerobic metabolism of the skeletal muscles.** I. Edes, I. Sohar, H. Mazarean, O. Takacs, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-103, S-104.

The effect of different periods of immobilization (1-6 weeks) on the aerobic and anaerobic metabolism of rabbit soleus and gastrocnemius muscles is studied by measuring the total activity of lactic dehydrogenase (LDH), malic dehydrogenase (MDH), aldolase (ALD), isocitrate dehydrogenase (ICDH), as well as the distribution of LDH isoenzymes. In the soleus muscle, the activity of the enzymes taking part in the oxidative metabolism (ICDH, MDH) decreases more rapidly than the rate of the glycolytic enzyme activities (LDH, ALD), while in the gastrocnemius muscle the rate of decrease in the activity of these enzyme pairs is reversed. For both types of muscles, increasing periods of immobilization lead to increasing amounts of LDH isoenzymes containing M subunits, which are characteristic for anaerobic metabolism. N.B.

**A82-40713 # The effect of hypoxic and hypobaric exercises on the blood-brain barrier in rats.** E. Dux, F. Joo (Magyar Tudomanyos Akademia, Biofizikai Intezet and Biologiai Kozpont, Szeged, Hungary), L. Dux, A. Gecse, A. Ottlecz, Zs. Mezei, G. Telegdy (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary), L. Bognar, P. Remes, and J. Hideg (Hungarian People's Army, Medical Corps., Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-105 to S-107. 10 refs.

The effect of intermittent hypoxic and hypobaric environments on the ultrastructure of the blood-brain barrier in rats is studied, and the ability of the isolated brain capillaries of the pups from the previously exposed rats, as well as adult male rats, to synthesize prostacyclin and prostaglandin (PG) is determined. Results show that in pregnant rats, hypoxic exercises enhance the transport processes through the endothelial cells, as shown by an incrased number of pinocytotic vesicles and a contraction of the nuclei of endothelial cells. Progesterone treatment prevents these alterations, and also normalizes the changes in the PGF 2 and PGE 2 synthesizing ability of the pups of hypoxic exercised rats. In adult male rats, no ultrastructural changes and milder alterations of PG synthesis are found. N.B.

**A82-40714 # Relations between respiratory and circulatory control during gravitational load in man.** S. Waurick (Leipzig, Universität, Leipzig, East Germany). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-108 to S-110. 11 refs.

The respiratory CO2-responses (0, 2, 4% CO2 in air) of five healthy males were investigated in a horizontal (0 deg), a 30 and 70 deg upright position. The response curves were shifted to the left, depending on the gravitational load. As the cardiac output diminishes under these conditions it is concluded that the influence of circulatory control on respiratory regulation is not based on the magnitude of bloodflow. The ratio of relative change in heart rate and respiratory minute-volume was 1:2.35 compared to 1:3 or 1:4 during workload. Furthermore increasing CO2-concentrations provoked chronotropic effects, with their direction and extent depending on the initial state. Going from horizontal to vertical positions the changes in the inclinations of CO2 heartrate and CO2 respiratory response curves were always correlated. (Author)

**A82-40715 # The effects of human growth hormone administration on the functional status of rat atrophied muscle following immobilization.** M. Apostolakis, A. Deligiannis, and A. Madena-Pyrgaki (Salonika, University, Salonika, Greece). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-111, S-112. 6 refs.

In 40 adult rats the right hind limb was immobilized by insertion of a metal pin. Fifteen days later the pin was removed and the animals divided into two equal groups: group A-untreated and group B-treated by 0.06 I.U. hGH daily. After two weeks the following parameters of both gastrocnemius muscles in all the animals were obtained: total EMG activity, contractile properties and work capacity. From the results it can be concluded that hGH administration (1) increased the EMG activity of atrophied muscle in group B by 73%, (2) increased the isometric tension of the same muscles by 58% and 65% (twitch and tetanic tension respectively), and (3) restored to a great extent (by 44%) the work capacity of the atrophied muscles in group B as compared to the atrophied muscles of group A. (Author)

**A82-40716 * #** **Gravitational adaptation of animals.** A. H. Smith (California, University, Davis, CA) and R. R. Burton (USAF, School of Aerospace Medicine, Brooks AFB, TX). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-113, S-114. 9 refs. Grant No. NGR-05-004-008.

The effect of gravitational adaptation is studied in a group of five Leghorn cocks which had become physiologically adapted to 2 G after 162 days of centrifugation. After this period of adaptation, they are periodically exposed to a 2 G field, accompanied by five previously unexposed hatch-mates, and the degree of retained acceleration adaptation is estimated from the decrease in lymphocyte frequency after 24 hr at 2 G. Results show that the previously adapted birds exhibit an 84% greater lymphopenia than the unexposed birds, and that the lymphocyte frequency does not decrease to a level below that found at the end of 162 days at 2 G. In addition, the capacity for adaptation to chronic acceleration is found to be highly heritable. An acceleration tolerant strain of birds shows lesser mortality during chronic acceleration, particularly in intermediate fields, although the result of acceleration selection is largely quantitative (a greater number of survivors) rather than qualitative (behavioral or physiological changes). N.B.

**A82-40717 #** **Some of biochemical parameters in rat brain during +Gz acceleration.** H. Debiec, W. Kowalski, S. Wroblewski, and K. Kwarecki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-117, S-118. 7 refs.

Stability of lysosomes and mitochondria were tested to determine the influence of acceleration on brain injuries. The degree of enzymatic adaptation to hypoxic conditions was also evaluated. After 1 hr of +5Gz acceleration, cytoplasmic activity of intralysosomal and intramitochondrial enzymes increased, which indicates damage of these cell structures. An increase in isoenzyme LDH5 activity suggests a change of cell metabolism to anaerobic. (Author)

**A82-40718 * #** **Alterations in heat loss and heat production mechanisms in rat exposed to hypergravic fields.** J. M. Horowitz, B. A. Horwitz, and J. Oyama (NASA, Ames Research Center, Biomedical Research Div., Moffett Field; California, University, Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-119, S-120. 7 refs. Grant No. NsG-2234.

A review of studies investigating the thermal response of rats exposed to hypergravic fields well below maximum tolerance levels is presented. It is concluded that several lines of evidence indicate that the neural switching network for temperature regulation and cardiovascular channeling of blood flow is transiently affected during the first hour a rat is exposed to hypergravity. Moreover, even after one hour of exposure, when the core temperature has fallen several degrees, shivering and nonshivering thermogenesis are not fully activated. Only after prolonged exposure to hypergravic fields do heat production mechanisms recover sufficiently to bring the core temperature back to a normal level. Thus, the data indicate a more rapid recovery of effector mechanisms for heat loss than for heat production. N.B.

**A82-40719 * #** **Chronic central vascular expansion induces hypokalemia in conscious primates.** M. C. Moore-Ede and D. A. Kass (Harvard University, Boston, MA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-123, S-124. 5 refs. Grant No. NsG-9054.

Central vascular expansion maintained for four days in conscious squirrel monkeys reconciles the apparently conflicting short-term fluid and electrolyte responses to water immersion and atrial balloon distension, with those described for prolonged weightlessness during space flight. The monkeys are subjected to an increased lower body positive air pressure (LBPP) of 20 torr which produces a 3 cm water increase in the central venous pressure. Results show a marked increase in the urinary excretion of sodium, potassium, and water during the firxt six hours of LBPP, and the diuresis is maintained throughout the period of LBPP, although the levels of sodium and potassium excretion decline after 24 hours of exposure. Plasma aldosterone transiently drops within the first three hours of LBPP, and then regains normal levels within 24 hours, after which time these levels are maintained despite the continued LBPP stimulus. It is suggested that the normal plasma aldosterone levels observed in the experiments, as well as during space flight, might, epresent a relative hyposecretion in terms of volume homeostasis and a relative hypersecretion with respect to plasma potassium regulation. Thus, kaliuresis and marked natriuresis is confined primarily to the first 24 hours of central volume expansion, a period for which comparable data from space flights are lacking. N.B.

**A82-40720 #** **Autonomic reactions in labyrinthectomized rabbits during centrifuge acceleration.** H. Urano, Y. Mizuno, S. Watanabe (Gifu University, Gifu, Japan), and G. Mitarai (Nagoya University, Nagoya, Japan). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-125, S-126. 6 refs.

The effects of acceleration produced by centrifugal force upon cardiopulmonary and somatosensory system were investigated using 23 adult rabbits. The experiments were included to compare with intact and labyrinthectomized animals, and also with awake and light anaesthetized ones. The centrifugal force (G) was applied up to 5 G making a load paradigm of staircase-type or trapezoid-type, in which each plateau level of G continued over 45 sec. The respiratory rate and heart rate were not in proportion to magnitude of acceleration. Responses by the staircase acceleration drew a hysteresis loop and it seems that the responses of respiratory and heart rates produced by acceleration took either of those two values on the hysteresis curve. It was also observed in some cases that the nystagmus induced by acceleration was correlated inversely to EMG response of hind limbs. (Author)

**A82-40721 #** **Labyrinth plugging as a model of suspended vestibular sensory input.** L. Korzenszky and L. Simon (Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-127, S-128.

A simple, clearly reproducible experimental method is described for blocking the labyrinthine functions in mice, which can serve as a model for studying the vestibular adaptations to normal gravity and also can make it possible to differentiate the physiological states of animals during space flight. The vestibulum is filled with a sterile mixture of beeswax and paraffin which prevents movements of the endolymph in the semicircular ducts, as well as the deformation of otolithic receptor organs during accelerational or gravitational stimulation. Animals that have undergone the operation on one side show considerable asymmetry of postural tone, which is later exaggerated into a continuous rolling toward the plugged side. Mystagmography, biaxial stabilography, and the lift reaction are used to quantitatively evaluate the asymmetry in the postural and motor behavior, as well as to determine the time curve of adaptation. N.B.

**A82-40722 #** **Space flight effects upon plasma and tissue lipids in rats.** I. Ahlers, E. Ahlersova, E. Paulikova, I. Datelinka, B. Smajda, M. Toropila, M. Praslicka (Univerzita Pavla Jozefa Safarika, Kosice, Czechoslovakia), and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-131, S-132. 6 refs.

Plasma and tissue lipids were determined in rats flown in average 20 days aboard four (690, 782, 936, 1129) Cosmos biosatellites. Immediately after landing there was an increase in lipomobilization, in plasma lipids, in liver, thymus, and bone marrow triglycerides. The creation and use of artificial gravity (Cosmos 936) prevented the appearance of 'fatty liver', the increase of phospholipids in serum and the accumulation of triglycerides in bone marrow. The additional stress (repeated short-term immobilization) on days 1-6 postflight acted more profundly on the space flight group, as compared with animals from terrestrial modelling experiments or with intact control ones. On day 25 postflight all changes disappeared but accumulation of bone marrow triglycerides persisted. (Author)

**A82-40723 #** **Effects of space flight factors and artificial gravity on deoxyribonucleoprotein in lymphoid organs of rats.** E. Misurova, M. Praslicka, K. Kropacova, T. Szabova (Univerzita Pavla Jozefa Safarika, Kosice, Czechoslovakia), and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh-Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-133, S-134. 5 refs.

The influence of space flight and artificial gravity on changes in the levels of deoxyribonucleoprotein (DNP) and nucleic acid is studied for the spleen and thymus of rats after approximately 20 days onboard three Cosmos satellites. Several hours after landing, partial DNP breakdown was found in the spleen and liver and the content of nucleic acids was reduced by about 60%. However, rats exposed to artificial gravity during the space flights show decreased DNP breakdown in the thymus, but not in the spleen. The changes in the DNP and nucleic acid levels evoked by the space flights recovered quickly after landing (within six days). Immobilization stress tests conducted 25 days after landing showed, on the other hand, a decrease in the DNA levels only in flight rats, but not in rats from model experiments or control groups. N.B.

**A82-40724 #** **Initiation of nutation in sunflower hypocotyls.** A. H. Brown (Pennsylvania, University, Philadelphia, PA) and D. K. Chapman (University City Science Center, Philadelphia, PA). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement*, vol. 23, Dec. 1980 (1982), p. S-135, S-136. 10 refs.

A biophysical model for simulating the circumnutation of sunflower hypocotyls, developed by Johnsson (1968), is tested for validity by observing the initiation of nutation in these plants. The preferred experimental method consists of observations of clinostatted plants at rest and during the application of a 1 G centripetal force in the axial direction of the plants. The results obtained are not decisively incompatible with Johnsson's model of circumnutation as a gravitropic hunting process. However, they are more easily reconciled with the less definitive concept of an endosenous oscillator which can initiate nutational motion when triggered by an axially imposed gravitational force without a significant prelude in the form of patently inductive wandering growth movements. N.B.

**A82-40725 # Changes of periodic protoplasmic movements on the fast clinostat.** W. Briegleb and A. Schatz (Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-137, S-138. 7 refs.

The effect of weightlessness on different physiological states of two organisms, the water plant Elodea canadensis and the slime mold Physarum polycephalum, is investigated. Small specimens of single cells of the test organisms are placed on a fast clinostat, and observed microscopically to detect changes of the periodic intracellular movements. The results are compatible with a general g-sensitivity of the cells and can be interpreted as an adaptation process of a rated value donor which cybernates the cell matrix. For Physarum, the speed of protoplasmic motion temporarily increases, and a long lasting induction of asymmetric half-period lengths, which may be more directly attributed to growth differentiation of the ectoplasm, is observed. In addition, the changes of period lengths, especially in Elodea, indicate correlations between endogenous clocks, especially those of circadian nature, and gravity. N.B.

**A82-40726 # Skin temperature and thermal comfort in weightlessness.** L. Novak (Universita J. E. Purkyne, Brno, Czechoslovakia), A. M. Genin (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), and S. Kozlowski (Polish Academy of Sciences, Laboratory of Applied Physiology, Warsaw, Poland). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-139, S-140. 6 refs.

The influence of weightlessness on the process of heat transfer between the human body and the outer environment during space flights is investigated. Results, obtained by an electrical dynamic katathermometer, show that skin temperatures during weightlessness differ markedly both at rest and after a work load has been applied from those under normal terrestrial conditions, including an increase in the skin temperature of the chest and a decrease in that of the extremities. In addition, the temperature of the space cabin exhibited a greater cooling power than did a test cabin on earth, despite the fact that they had similar temperature variations. N.B.

**A82-40727 # Aortic and tibial bloodflow response to lower body negative pressure /LBNP/.** J. A. Loeppky, E. R. Greene, D. E. Hoekenga, M. D. Venters, and M. W. Eldridge (Lovelace Foundation for Medical Education and Research; U.S. Veterans Administration Medical Center, Albuquerque, NM). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-141 to S-144. 12 refs.

Blood velocities in the ascending aorta from the suprasternal notch were determined by a 3.0 MHz pulse Doppler velocity meter (PD) for seven subjects before, during, and after progressive 5 min stages of LBNP. Changes in the stroke volume (SV) were calculated from the systolic velocity integrals, while the blood flow in the posterior tibial artery was estimated by using a unique 20 MHz PD. At -20 torr, mean SV fell by 11% and gradually declined by 48% with successive increments of LBNP to -60 torr. Mean tibial flow fell progressively with LBNP stress, due to an increase in the reverse flow component and a reduction in the peak forward flow and diameter. SV increased and the heart rate fell sharply during the first 15 sec of recovery. In two subjects, vasovagal symptoms were observed, during which the SV rose by 86% and more than compensated for the drop in heart rate. It is suggested that vasovagal presyncope is accompanied by a paradoxical increase in venous return and that the reduction in heart rate is the primary cardiovascular event. N.B.

**A82-40728 # Effects of lower body negative pressure on the reliability of cardiovascular system using X-ray kymograms.** Y. G. Zorbas, Mr. Sadeghi-Shoja, and S. Khaligh (European Institute of Environmental Cybernetics, Athens, Greece). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-145, S-146. 16 refs.

The effects of lower-body negative pressure (LBNP) on man's cardiovascular system reliability (functional capacity) were investigated by the X-ray kymography method. Twenty-six experiments were conducted on 16 physically healthy males in the age group from 18 to 22 years. X-ray kymograms were recorded before and during the exposure to LBNP of -40 and -60 mm Hg. Diastolic, systolic and stroke volumes of the heart were computed. A decrease in the diastolic, systolic and stroke volumes and cardiac output, and contractile activity and an elevation in tilting of myocardium axis were determined. Under the influence of LBNP the reliability of the cardiovascular system exhibits an appreciable impairment. (Author)

**A82-40729 # Vibration and decompression gas bubbles.** U. I. Balldin (Forsvarets Forskningsanstalt, Stockholm, Sweden) and A. Sporrong (Kungl. Karolinska Institutet, Stockholm, Sweden). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-147, S-148. 7 refs.

The paper describes experiments conducted to determine if vibrations, similar to those that may appear in helicopter flights, might also release decompression gas bubbles after diving. Subjects are exposed to intermittent hyperbaric conditions while performing bicycle ergometer work, followed by hypobaric exposure, which causes decompression gas bubbles in great amounts. During hypobaric exposure the subjects are exposed to alternating periods of 0.23 g sub z (peak) vibrations of 15 Hz and periods of nonvibrations. Results show that no significant differences in the release of decompression gas bubbles could be found between 15 Hz vibration and nonvibration conditions. Similar results are found in a few experiments using a 25 Hz vibration. N.B.

**A82-40730 # Relation between physiological effects of gravitational forces and that of magnetic forces.** H. Saiki, M. Saiki, M. Nakaya, M. Sudoh, M. Abe, and Y. Taketomi (Jikei University, Tokyo, Japan). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-149, S-150. 5 refs.

Physiological functions of mice are examined during and after exposure to low magnetic fields (1% intensity of the geomagnetic field) under simulated hypogravic conditions, and the results compared to those of geomagnetic field exposure. Results indicate a decline in the healing process of wounds inflicted with a punch to the dorsum under hypokinetic fields after exposure to low magnetic fields. In addition, the detrimental effects of hypokinetics on swimming capacity is attenuated by low magnetic fields. However, the deterioration in swimming capacity caused by hypokinetic exposure gradually ameliorates over time, and the swimming capacity returns to normal after a three month hypokinetic exposure. N.B.

**A82-40731 # Orthostatic tolerance and exercise response before and after 7 days simulated weightlessness.** A. Guell, L. Braak, J. Bousquet, M. Barrere, and A. Bes (Centre Hospitalier Universitaire Ranguell, Toulouse, France). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-151, S-152. 5 refs.

Four volunteers underwent orthostatic tests before and after a 7-day period of prolonged bedrest in antiorthostatic position (-4 deg). A +65 deg tilt test (head up) during 20 minutes and a squat-stand test were performed. Tests on an ergometric bicycle were also performed. Concerning orthostatic tolerance after the simulation, a greatly increased intolerance among two of the volunteers was noted, that can be translated as a presyncopal state with severe arterial hypotension, whereas the other two volunteers showed a paradoxical reaction with a hypertensive spike. The exercise response was also perturbed after, especially for one of the volunteers for whom the test had to be stopped. It is concluded that these results confirm the value of such a position when one intends to simulate the cardiovascular changes that occur during weightlessness. (Author)

**A82-40732 # Postural control related to the different tilting body positions.** V. Litvinenkova F. Hlavacka, and M. Krizkova (Slovenska Akademia Vied, Ustav Normalnej a Patologickej Fyziologie, Bratislava, Czechoslovakia). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-153, S-154.

The effects of 5 minutes exposure to different body tilting positions on the patterns of postural control were investigated. By means of a stabilographic method the influence of recumbent (supine) position - head horizontal 0 deg, head up +60 deg, head down -15 deg and sitting position head +90 deg was measured. The evaluated parameters of the posture stability were: statokinesigram area (A) and the velocity index of body sways (I). Thirty-one healthy men aged 18-24 were tested after all tilting exposures with eyes open and eyes closed. Romberg quotient (R) was computed from data obtained. Horizontal position 0 deg induced the mildest decrease of postural stability. The most destabilizing effect after +60 deg tilting was found. The significant changes were manifested only in subjects with eyes closed. It was the R for A which reflected the reduced ortostatic tolerance most sensitively. (Author)

**A82-40733 # The reaction of simulated and true weightlessness on digestive tract of rats.** P. Groza, A. Bordeianu, A. Boca, and S. Cananau (Academia de Stiinte Medicale, Bucharest, Rumania). *(International Union of Physiological Sciences, Annual Meeting, 2nd, Budapest, Hungary, July 13-19, 1980.) Physiologist, Supplement,* vol. 23, Dec. 1980 (1982), p. S-155, S-156.

In order to better differentiate the reactions produced by stress and weightlessness, changes in the digestive tract of rats produced by restraining their movements are determined and compared with the changes produced in true space flight. Histochemical studies show that 15-30 days of terrestrial hypokinesia produces modifications similar to those evoked by a space flight lasting 18.5 days, including decreased mucopolysaccharide secretion in different digestive organs, increased secretion of several enzymes of the intestinal wall, and increased secretory activity of antral and duodenal gastrin secreting cells. Gastric acid and pepsin secretions, as well as secretions of plasmatic corticosterone, increase only during terrestrial hypokinesia, and not during space flights, and are a result of stress reactions. N.B.

**A82-40734** **International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, September 29-October 2, 1981, Proceedings.** Physiologist, Supplement, *vol. 24, Dec. 1981 (1982). 126 p.*

The proceedings of the Third Annual Meeting of the IUPS Commission on Gravitational Physiology are presented. Particular consideration is given to such topics as the reduction in renal artery blood flow impedance during upright tilt in man; the atrophy of rat skeletal muscles in simulated weightlessness; induced hypokinesia and antiorthostasis as a simulation of weightlessness; the restraint of animals in space research; and cellular aspects of gravitational biology. Attention is also given to embryonic development during chronic acceleration, cardiac and cerebral vascular adaptation to gravitational stresses in man, evidence for arrested bone formation during space flight, and gravity perception and asymmetric growth in plants. B.J.

**A82-40735** # **Reduction in renal artery blood flow impedance during upright tilt in man.** J. A. Loeppky, E. R. Greene, and M. W. Eldridge (Lovelace Foundation for Medical Education and Research, Albuquerque, NM). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-1, S-2. 6 refs.

Because of the relative inaccessibility of the renal vascular bed, there is little information on the dynamics of renal artery blood flow in response to alterations in gravitational stress in man. In the present study, a 5.0 MHz real-time two-dimensional pulsed Doppler duplex scanner was used to noninvasively characterize the changes in renal artery impedance and flow during orthostasis. These changes were then compared to changes in the central circulation in an attempt to define the redistribution of pressures and flow occurring in the central and renal vascular beds. B.J.

**A82-40736** # **Relevance of aldosterone on circulatory, renal and blood reactions during simulated weightlessness and on aerobic metabolic rate.** W. Skipka and J. Stegemann (Köln, Deutsche Sporthochschule, Cologne, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-3, S-4. 13 refs.

The present study examined the relevance of the decrement in aldosterone level during simulated weightlessness by head-out water immersion (WI) with respect to circulatory, renal, and blood reactions. Four-hour WI experiments were performed in which aldosterone was substituted by injections of Aldocorten at the beginning and after two hours of WI. Red cell 2,3-DPG concentration increased significantly in the opposite direction to that of the controls (WI without aldosterone). Additional experiments showed that aldosterone significantly augmented oxygen uptake during work loads. This indicates that the WI-induced decrease of performance capacity can be due to a concomitant aldosterone decrement. B.J.

**A82-40737** # **Relation between sensoric and motoric function of Wistar rats after space flight by biosatellite Cosmos 1129.** M. Poppei, K. Hecht, V. S. Oganov, V. Ia. Klimovitskii, T. Schlegel, D. Sass, E. Wachtel, and V. S. Magedov (Berlin, Humboldt-Universität, Berlin, East Germany; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-7, S-8. 7 refs.

The locomotor avoidance reflex of rats on Cosmos 1129 was evaluated in order to determine the relationship between sensory and motor functions. An automatic timing clock was used to study the central nervous reaction time and the motor reaction time. Changes in muscle structure after 18 and one-half days of space flight were found to be reflected in changes in motor reaction. Markedly shortened motor reaction times pointed to a motor hyperactivity related to an increased muscle metabolism, indicating the effects of weightlessness and a stress reaction. B.J.

**A82-40738** * # **Atrophy of rat skeletal muscles in simulated weightlessness.** D. D. Feller, H. S. Ginoza, and E. R. Morey (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-9, S-10. 11 refs.

A hypokinetic rat model was used for elucidation of the mechanism of skeletal muscle wasting which occurs in weightlessness. Rats were suspended from a back-harness with the head tilted downward and the hind limbs totally unloaded. A progressive decrease in the size of the soleus muscle from suspended rats was observed as a function of time. The rate of protein degradation of the homogenates from the soleus muscles of suspended and control animals was not significantly different. The rate of cell-free protein synthesis was severely repressed in the atrophied muscle. An initial rise in the levels of plasma glucose and corticosterone was observed on the second day of suspension, but they subsequently returned to normal values. (Author)

**A82-40739** # **The effect of hypokinesia and hypoxia on the function of muscles.** T. Szilagyi, J. Hideg, E. Beranyi, A. Pozsgai (Hungarian People's Army, Medical Corps, Hungary), A. Szoor (Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-11, S-12. 5 refs.

Experiments were performed on adult male rats to study the effects of hypokinesia and hypoxia on the extensor digitorum longus, gastrocnemius, and soleus muscles. It is shown that plaster cast immobilization causes rapid and pronounced structural and functional changes in all three types of muscles, first of all in the antigravitational soleus muscle. These changes are similar to those observed in weightlessness. Hypokinesia causes slight changes which develop slowly, while hypoxia (the equivalent of 7000 m above sea level for eight hours a day) intensifies the effect of hypokinesia. B.J.

**A82-40740** # **Analysis of transient cardiovascular response to orthostatic stress using noninvasive methods.** H. Pessenhofer, G. Schwaberger, N. Sauseng, and T. Kenner (Graz, Universität, Graz, Austria). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-13, S-14. 7 refs.

The application of noninvasive methods for the analysis of dynamic control phenomena in the cardiovascular system on clinical and space research problems is demonstrated. In an investigation, performed in 10 volunteers, the transient responses of heart period, systolic time intervals and impedance cardiogram were recorded immediately after a sudden change in body position from horizontal to vertical (tilt-table), beat-per-beat for one minute. To estimate the time course of variables which could not be directly determined by noninvasive methods, a mathematical model of the physiological system was used, the free parameters of which were estimated by means of a systems identification procedure. The resulting time functions of the measured variables and of the variables calculated on the basis of the model (mean arterial pressure, enddiastolic filling pressure, total peripheral resistance) demonstrated the interplay between baroreceptor reflex and Frank-Starling-mechanism in the adjustment of the mean arterial pressure after a change in body position. (Author)

**A82-40741** * # **Antiorthostatic hypokinesia and circulation in the rat.** V. Popovic (Emory University, Atlanta, GA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-15, S-16. Grant No. NGR-11-001-009.

Circulatory mechanisms that occur during exposure to head-down hypokinesia as well as during readaptation to control conditions were studied on unanesthetized unrestrained Sprague-Dawley rats exposed to hypokinesia for seven days. The heart rate was slightly elevated, and the right atrial pressure increased to 4 mm Hg, but returned to 0 mm Hg after three days of exposure. Mean arterial blood pressure decreased from 118 to 100 mm Hg during early exposure to antiorthostatic hypokinesia. Cardiac output and stroke volume of resting rats increased during early exposure to hypokinesia but decreased continuously during the next seven days. The results indicate that antiorthostatic hypokinesia induces circulatory changes similar to those seen in astronauts after several days of exposure to 0 g forces. B.J.

**A82-40742** # **Protein composition of mRNA containing 18S-40S subribosomal particles in soleus muscle before and after immobilization.** I. Sziklai, D. Szekely, Z. Kiss, and F. Guba (Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-17, S-18.

**A82-40743** # **Effects of prolonged bedrest in antiorthostatic position on rCBF measured by 133Xe inhalation technique - Effects of clonidine.** A. Guell, G. Victor, A. Bru, P. Montastruc, and A. Bes (Centre Hospitalier Universitaire Rangueil, Toulouse, France). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-19, S-20. 12 refs.

Experiments involving prolonged bedrest in antiorthostatic position were performed in order to simulate cardiovascular changes observed in weightlessness. Six young healthy subjects were placed in strict bedrest in a -4-deg antiorthostatic position for seven days. The rCBF (regional cerebral blood flow) measurements were made by an Xe-133 inhalation method; three of the subjects received 0.450 mg of clonidine during the experiment. A constant increase in rCBF was observed during the first 12 hours in subjects who did not receive clonidine; at the 72nd hour, all values returned to the basal state. These findings agree with the rapid correction of hemodynamic disturbances observed in the first days of weightlessness. In subjects treated with clonidine, the increase in rCBF did not occur. B.J.

**A82-40744 * # Suspension restraint - induced hypokinesia and antiorthostasis as a simulation of weightlessness.** X. J. Musacchia, J. M. Steffen (Louisville, University, Louisville, KY), and D. R. Deavers (College of Osteopathic Medicine and Surgery, Des Moines, IA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-21, S-22. 5 refs. Grants No. NsG-2191; No. NsG-2325.

Muscle, renal, fluid and electrolyte responses were measured in suspended rats; the hind limbs are non-load bearing and the front limbs can be used for feeding and grooming. Hind limb hypokinesia reverses after removal from the suspension harness. This suspension system is adjustable for a head-down tilt to produce antiorthostatic responses which are also reversible. Responses to hypokinesia or antiorthostatic hypokinesia for up to 14 days were measured, e.g., muscle atrophy: soleus greater than gastrocnemius equals plantaris greater than extensor digitorum longus, kaliuresis, and increased excretion of urea, NH3, and 3 methylhistidine. Muscle protein loss, a response to a reduction in RNA, is also reversible. A head-down tilt for 7-14 days results in diuresis and natriuresis. These changes are reversed within 24 hours after removal from the restraint harness. Physiological effects of suspension restraint can be used to simulate and predict responses to microgravity exposure. (Author)

**A82-40745 # Root cell gravireaction - Hormone interaction.** P. E. Pilet (Lausanne, Université, Lausanne, Switzerland). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-25 to S-28. 9 refs.

Some interactions between two endogeneous hormones, indole-3yl-acetic acid (IAA) and abscisic acid (AbA), were studied in gravistimulated maize roots (cultivars of Zea mays). It is found that the growth reaction of the gravistimulated roots is regulated by the IAA movement, which is strongly acropetal and by the AbA transport, which is preferentially basipetal. These two hormones, being found in larger amounts in the lower part of the growing region, induce a growth inhibition in this region, causing a downward root curvature. B.J.

**A82-40746 # The effect of gravity on the distribution of plant growth substances in plant tissues.** W. Hartung (Würzburg, Universität, Würzburg, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-29 to S-32. 14 refs. Research supported by the Deutsche Forschungsgemeinschaft.

The distribution of abscisic acid (ABA) in root tip tissues and of indole acetic acid (IAA) in shoot tissues of several plants is not affected by gravity. Pretreatment with ABA (roots) and IAA (shoots), however, increases the geotropic reaction of the organs. Treatment of the roots and shoots that alters the pH-gradients within the cells and thus the cellular phytohormone distribution reduces the sensitivity of horizontally placed plant organs to gravity. The results communicated in this paper cast doubt on the validity of the Cholodny Went theory. It appears possible that gravity influences the cellular compartmentation of plant growth substances. (Author)

**A82-40747 # Involuntary and voluntary mechanisms for preventing cerebral ischemia due to positive /Gz/ acceleration.** E. H. Wood, E. H. Lambert, and C. F. Code (Mayo Medical School, Rochester, MN). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-33 to S-36. 11 refs.

**A82-40748 # Restraint of animals in space research.** R. R. Burton, J. W. Burns, and A. H. Smith (USAF, School of Aerospace Medicine, Brooks AFB, TX; California, University, Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-41 to S-44. 26 refs.

The restraint of animals for orientation purposes in a space (zero G) environment for research purposes is considered. Attention is given to types of restraint; restraint tolerance criteria; and animal training, adaptation, and selection for restraint. Potential problems concerning animal restraint in a space environment are examined. B.J.

**A82-40749 * # Animal models for simulating weightlessness.** E. Morey-Holton and T. J. Wronski (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-45 to S-48. 17 refs.

NASA has developed a rat model to simulate on earth some aspects of the weightlessness alterations experienced in space, i.e., unloading and fluid shifts. Comparison of data collected from space flight and from the head-down rat suspension model suggests that this model system reproduces many of the physiological alterations induced by space flight. Data from various versions of the rat model are virtually identical for the same parameters; thus, modifications of the model for acute, chronic, or metabolic studies do not alter the results as long as the critical components of the model are maintained, i.e., a cephalad shift of fluids and/or unloading of the rear limbs. B.J.

**A82-40750 # Results of investigations of weightlessness effects during prolonged manned space flights onboard Salyut-6.** O. P. Kozerenko, A. I. Grigor'ev, and A. D. Egorov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-49 to S-54. 15 refs.

Salyut-6 results indicate that a prolonged exposure to weightlessness may induce homeostatic changes in various physiological systems, bringing the body to a level of functioning that is different from that on earth. The physiological changes observed during and after flights were reversible; return to normal occurred after a relatively short period of readaptation. There was no linear correlation between flight duration and the level of inflight and postflight reactions. B.J.

**A82-40751 # Results of biosatellite studies of gravity-dependent changes in the musculo-skeletal system of mammals.** V. S. Oganov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-55 to S-58. 26 refs.

Results of rat experiments performed on Cosmos satellites indicate that space flight may induce not only atrophic changes in the slow antigravitational muscles but also adaptive and biologically expedient transformations of phenotypes of muscle fibers, including (in all likelihood) reprogrammed synthesis of contractile muscle proteins. This may cause the rearrangement of the functional profile of muscles: the slow antigravitational soleus muscle acquires the features typical of fast muscles, while the fast brachialis muscle gains those peculiar to slow muscles. B.J.

**A82-40752 # Mechanisms of the effects of weightlessness on the motor system of man.** I. B. Kozlovskaia, Iu. V. Kreidich, and A. S. Rakhmanov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-59 to S-64. 15 refs.

A broad spectrum of motor effects of weightlessness has been revealed, including changes in muscle properties, shifts in sensory systems and reflex mechanisms, and perceptual and coordination disorders. These changes are usually attributed primarily to weight-bearing unloading and related muscle atrophy. But clinical and physiological examinations of the motor function performed during 140 and 175 day flights on Salyut-6 are at variance with this idea and point to a multifactorial genesis of the postflight changes. In particular, the magnitude and duration of changes in different components of the motor system of crew members were found to be uncorrelated. B.J.

**A82-40753 # Adaptation of the rat skeleton to weightlessness and its physiological mechanisms - Results of animal experiments aboard the Cosmos-1129 biosatellite.** D. J. Simmons (Washington University, St. Louis, MO). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-65 to S-68. 12 refs.

Results from Cosmos-1129 and from other Cosmos biosatellites have provided an incisive description of the effect of null gravity on the kinetics of the rat skeleton, and its cells and mineral metabolism. The applicability of the rat model to the adult human astronaut skeleton has yet to be validated in all of its aspects. The rat model is least controversial in terms of changes in bone matrix formation. It is most controversial in terms of how it relates to the resorption/remodeling rates of bone. B.J.

**A82-40754 # Cellular aspects of gravitational biology.** M. G. Tairbekov and G. P. Parfenov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct.2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-69 to S-72. 20 refs.

The mechanisms of energy use and material transport through the walls of a biologic cell are reviewed, along with the results of spaceborne bioscience experiments, to conclude that cells with dimensions of one cubic millimeter or less function independent of a gravity field. Additionally, the absence of gravity-induced convection gradients in space environments enhance the equilibrated processes of cell functions. The effects become more complicated with multicellular species, which may have both vegetative and animal components and display teleocentric behavior during growth. Changes which occur in multicellular species, or in a cell which is part of a multicellular organism, are concluded to occur due to metabolic shifts caused by energy process changes within and outside of gravity fields. M.S.K.

**A82-40755 * #** **Embryonic development during chronic acceleration.** A. H. Smith and U. K. Abbott (California, University, Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct.2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-73, S-74. 7 refs. Grant No. NsG-7493.

Experiments carried out on chicken eggs indicate that the embryo is affected during very early development, especially over the first four days, and during hatching. In the first four days, the brain develops as well as the anlage for all other organs. In addition, the heart commences to function and the extraembryonic membranes that compartmentalize the egg contents form. The latter require an appreciable extension and folding of tissue which may be disrupted by the mechanical load. Observations of embryonic abnormalities that occur during chronic acceleration suggest an inhibition of development of the axial skeleton, which is rarely seen otherwise, a general retardation of embryonic growth, and circulatory problems. The final stages of development (after 18 days) involve the uptake of fluids, the transition to aerial respiration, and the reorientation of the embryo into a normal hatching position. At 4 G mortality is very high during this period, with a majority of embryos failing to reorient into the normal hatching position. C.R.

**A82-40756 * #** **Suppression of osteoblast differentiation during weightlessness.** W. E. Roberts, P. G. Mozsary (University of the Pacific, San Francisco, CA), and E. R. Morey (NASA, Ames Research Center, Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-75, S-76. Research supported by the Pacific Dental Research Foundation; Grants No. NCA2-OR-588-002; No. NIH-DE-05136; No. NIH-2-S07-RR-05301.

It is pointed out that associated with weightlessness is a marked depression or arrest of bone formation. Although the mechanism of this effect is unknown, it probably involves a failure of osteogenic induction. The present study's objective is to determine if weightlessness alters osteoblast differentiation, as evidenced by a change in relative distribution of large to small nuclei in rat moral periodontal ligament of the maxilla. In conjunction with the U.S./USSR Biological Satellite Program, male Wistar rats were flown aboard a modified Soviet Vostok spacecraft (Cosmos 1129). The results of the study are discussed. Morphometric investigations suggest that depleted numbers of preosteoblasts may be an important factor in the inhibition of bone formation during weightlessness. G.R.

**A82-40757 * #** **Clinostat exposure and symmetrization of frog eggs.** G. W. Nace (Michigan, University, Ann Arbor, MI) and J. W. Tremor (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-77, S-78. 6 refs. Grant No. NAGW-29; Contract No. NAS2-10945.

Since the orientation of unfertilized eggs and the righting of eggs after grey crescent formation do not affect the axes, attention here is directed toward a comparative study of the initial rotation of the fertilized egg, the so-called rotation of orientation (R-of-O). The goal of the investigation is to determine the timing and dynamics of the R-of-O (as distinct from inversion rotations), to confirm prior observations, and to examine the influence of gravity compensation at periods that might be crucial. Gravity compensation for 1 hr during the R-of-O is found to yield fewer abnormalities. It is hypothesized that it changes the axes and that return to normal conditions permits regulation. Longer exposure is found to yield more abnormalities, perhaps by perturbing both the action of the aster and regulation. C.R.

**A82-40758 * #** **The intracellular responses of frog eggs to novel orientations to gravity.** G. P. Radice, A. W. Neff, and G. M. Malacinski (Indiana University, Bloomington, IN). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-79, S-80. 5 refs. Grant No. NAGW-60.

It is found that multiple short doses of ultraviolet light are as effective as a single large dose in producing neural defects. In addition, 180 deg rotation (inversion) of irradiated eggs reduces the ultraviolet effect. Since yolk platelets may be the gravity sensing mechanism, their size, density, and distribution in normal and inverted eggs are investigated. Large platelets are denser and for the most part are in a distinct zone in the vegetal hemisphere, whereas small platelets are less dense and occur in the animal hemisphere. When inverted, the large platelets flow into the animal hemisphere as a coherent mass and partially displace the small platelets. Inversion is thought to rearrange cytoplasmic components necessary for later neural development into an appropriate configuration. C.R.

**A82-40759 #** **Gravity sensing system formation in tadpoles /Rana temporaria/ developed in weightlessness simulation.** J. Neubert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-81, S-82. 6 refs.

**A82-40760 #** **Short term gravity effects on volume homeostasis in man - Assessment of transvascular fluid shifts after graded tilt.** H. Hinghofer-Szalkay, T. Kenner, and M. Moser (Graz, Universität, Graz, Austria). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-83, S-84.

**A82-40761 #** **Effect of sustained Gz acceleration on lung fluid balance - An ultrastructural study.** W. J. Weidner, L. F. Hoffman, and D. O. DeFouw (California, University, Davis, CA; New Jersey, College of Dentistry and Medicine, Newark, NJ). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-85, S-86.

In order to examine the effects of sustained acceleration on lung fluid balance, chickens were centrifuged at +2Gz or +4Gz for one hour. At the end of the centrifuge run, the animals were immediately anesthetized with pentobarbital and the lungs were fixed by tracheal instillation at 20 cm H2O pressure with 2% glutaraldehyde. Interstitial pulmonary edema was observed in those animals subjected to 4Gz acceleration. Micromorphometric data indicate that thickening of the pulmonary interstitial space separating alveolar epithelial cells and capillary endothelium occurred in the 4Gz group. Both 2G and 4G acceleration were associated with a decrease in mean capillary diameter. Endothelial vesicular density was progressively reduced in upper and middle lung sections at 2G and 4G, while this parameter was progressively increased in dependent lung sections. Results suggest that pulmonary edema can occur at acceleration intensities below 5 Gz if centrifuge runs are prolonged. (Author)

**A82-40762 #** **Vestibular effects of water immersion and Clonidine.** S. Vesterhauge, A. Mansson, F. Bonde-Petersen, P. Norsk, and K. Zilstorff (Rigshospitalet; Copenhagen, Universitet, Copenhagen, Denmark). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-87, S-88. 6 refs. Research supported by the Danish Space Board and Boehringer Ingelheim.

Attention is given to the way in which circulatory changes modify the vestibular function and the way in which they contribute to the development of space motion sickness. Circulatory changes similar to those occurring during microgravity can be induced by head-out water immersion; these changes are modified here by the administration of Clonidine. It is shown that circulatory changes induced by simulated weightlessness increase the unphysiologic caloric response but do not influence the physiological function of the semicircular canals. Clonidine is found to reduce the caloric response and increase the rotatory phase lag, probably due to an 'unspecific' central sedation rather than to circulatory changes. C.R.

**A82-40763 #** **The effect of Clonidine on peripheral vasomotor reactions during simulated zero gravity.** F. Bonde-Petersen, A. Guell, K. Skagen, and O. Henriksen (Copenhagen, Universitet, Copenhagen, Denmark; Centre Hospitalier Universitaire Rangueil, Toulouse, France). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-89, S-90. 8 refs.

The influence of prolonged bedrest (BR) on the venous compliance (VC) and the vasocunstrictor response in the arterioles during local increases in hydrostatic pressure and during tilt are investigated. BR is also combined with Clonidine medication. Clonidine stimulates the CNS cardiovascular depressor center and the peripheral alpha-receptors. Clonidine's main effect is found to be as a central sympathetic nervous activity (SNA) depressor. Water immersion per se is found to depress SNA; an additive effect of water immersion and Clonidine shows an additional reduction of splanchnic vascular resistance down to 50% of control values. This effect counteracts the increased total peripheral resistance which otherwise would be a consequence of an increased alpha stimulation. A fall in mean arterial pressure is therefore observed. C.R.

**A82-40764 #** **Cardiovascular effects of Clonidine during 20 hours head down tilt /-5 deg/.** P. Norsk, F. Bonde-Petersen, and J. Warberg (Copenhagen, Universitet, Copenhagen, Denmark). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-91, S-92. 8 refs.

The cardiovascular effects of Clonidine during 20 hr of bedrest where the head is tilted downward by 5 deg are investigated, as are the effects of Clonidine on exercise capacity and orthostatic tolerance before and after the bedrest. The stress induced by the 20 hr of bedrest is found to be counteracted by the central depressor effect of Clonidine on the heart. The peripheral effect of Clonidine increasing forearm vascular resistance, venous tone, and lung tissue volume facilitates the adaptation to the microgravity environment. C.R.

**A82-40765 #** **Cardiac and cerebral vascular adaptation to gravitational stresses in man.** A. Belluschi (Ospedale Maggiore Ca'Granda, Milan, Italy). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-93, S-94.

A polygraphic method comprising a cerebral rheogram (REG), digital plethysmography, and a phonocardiogram (PCG) is used in analyzing the behavior of the cerebral vascular resistances and that of the cardiac output. The influence of the gravitational vector, which is constant in its direction, is found to change for the different postures and in the arterial and venous network, the brain, and the peripheral area. It is concluded that the gravitational vector is a stimulus for the regulation of the arterial tone. Another finding is that the gravitational vector associated with the thorax bellows is a coefficient of the venous outflow and as such a stimulus to the cerebral capillary vascular reactions. C.R.

**A82-40766 * #** **Response of rat body composition to simultaneous exercise and centrifugation at 3.14g.** G. C. Pitts (Virginia, University, Charlottesville, VA) and J. Oyama (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-95, S-96. 9 refs.

A study is described calling into question the hypothesis that an increased physical load during chronic centrifugation contributes to the body composition changes observed in centrifuged rats. Considering fat-free and fat-free dry masses of the total body and carcass, it is seen that centrifugation combined with either wheel running or restraint reduced these masses to approximately 85% of the respective 1-g values, that is, the same result with either sedentary rats or rats running several hundred meters per day. It is pointed out that if an effect of a centrifugation-induced load is present but hidden by opposing factors, an analysis of variance should reveal it as an interaction between acceleration and other variables; however, no such interactions are found here. Tables are included emphasizing the pervasive influence of chronic centrifugation after only 12 days exposure. C.R.

**A82-40767 * #** **Evidence for arrested bone formation during spaceflight.** R. T. Turner, J. D. Bobyn, P. Duvall, E. R. Morey, D. J. Baylink, and M. Spector (NASA, Ames Research Center, Moffett Field, CA; South Carolina, Medical University; U.S. Veterans Administration Medical Center, Charleston, SC; U.S. Veterans Administration, Medical Center, Tacoma, WA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-97, S-98. 7 refs.

Addressing the question of whether the bone formed in space is unusual, the morphology of bone made at the tibial diaphysis of rats before, during, and after spaceflight is studied. Evidence of arrest lines in the bone formed in space is reported suggesting that bone formation ceases along portions of the periosteum during spaceflight. Visualized by microradiography, the arrest lines are shown to be less mineralized than the surrounding bone matrix. When viewed by scanning electron microscopy, it is seen that bone fractures more readily at the site of an arrest line. These observations are seen as suggesting that arrest lines are a zone of weakness and that their formation may result in decreased bone strength in spite of normalization of bone formation after flight. The occurrence, location, and morphology of arrest lines are seen as suggesting that they are a visible result of the phenomenon of arrested bone formation. C.R.

**A82-40768 #** **Validation of a new method for studying the effects of vibration on the primate spine.** P. Quandieu and C. Nogues (Laboratoire Central de Biologie Aérospatiale, Paris, France). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-99, S-100.

The results obtained from miniature accelerometers implanted anteriorly on the vertebral bodies of primates are discussed. It is found that when stimulated by vibration, the intervertebral disk behaves as a low-pass filter. The filter is linear, even when the amplitude of stimulation acceleration reaches relatively high levels (0.4 G). Muscle activity causes a variation in the transfer properties of the disk. Muscle contraction improves its low-pass properties (lower transmission in the high-frequency range), whereas muscle relaxation causes a translation of filter properties towards the high-frequency range (transmission at 80 Hz improving with nembutal and curare). Removal of the nucleus pulposus brings about a shift in resonance to the high-frequency range, the occurrence of nonlinearity, and a serious increase in transfer toward that high-frequency range of the lumbar disks nearest the sacrum. C.R.

**A82-40769 * #** **Chronic acceleration and brain density.** L. F. Hoffman and A. H. Smith (California, University, Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-101, S-102. 9 refs. Grant No. NsG-7493.

Tests carried out on rabbits show that the effect of chronic acceleration is not uniform among the various tissues studied. Although body mass is reduced by the treatment, as expected, no change is apparent in brain mass o in the density of cerebrospinal fluid. Acceleration-induced changes are encountered in tissue density, the myocardium exhibiting a transient increase followed by an exponential decrease toward a limit and the brain showing an arithmetic increase in density with continued exposure to 2.5 G. The data are seen as suggesting that a specific brain load is not a regulated phenomenon and that no physiological processes occur to attenuate the increased load imposed by the hyperdynamic environment. An equation is derived indicating that the stimulus potential per unit of brain load increases with body size, even though brain density decreases and cerebrospinal fluid density increases. C.R.

**A82-40770 #** **Gravity only dependent receptor field of the vestibular sensors - its significance in orbital flight.** T. Gualtierotti (Milano, Università, Milan, Italy). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-103, S-104. 5 refs.

In the bull frog the gravity dependent receptive field of tonic and phasic-tonic vestibular receptors covers nearly the entire 360 deg solid angle. Consequently any given position of the head will modify the adapted firing rate of the entire family of statoreceptors, in an orderly pattern. As a result, stationary responses to gravity effectively modulate the evoked activity of the vestibular receptors due to head movement. In '0' g this organized gravity dependent pattern disappears altering the amplitude and mode of the vestibular responses to head movements. The problem is further complicated by the random 'wandering' of the cell mean frequency which is orders of magnitude larger in '0' g than on earth. (Author)

**A82-40771 #** **Relation between physiological effects of gravitational forces and that of magnetic forces. II.** H. Saiki, M. Sudoh, M. Nakaya, and M. Abe (Jikei University, Tokyo, Japan). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-105, S-106. 6 refs.

The effects of various intensities of magnetic field (low, geomagnetic, and high) on the metabolic and cardiovascular functions of albino rats are investigated under various gravity conditions. The high magnetic field tends to diminish the effects of hypodynamic exposure in such parameters as urine volume and metabolic rate at rest. The low magnetic field tends to attenuate the effect of the hypodynamic exposure in such parameters as urine volume and the excretion rate of K(+) and Ca(2+). C.R.

**A82-40772 * #** **Core temperature and brainstem auditory evoked potentials as complimentary noninvasive measures of central neural function during exposure to hypergravic fields.** T. A. Jones and J. M. Horowitz (California, University, Davis, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-107, S-108. Grant No. NsG-2234; Contract No. NAS5-33146.

**A82-40773 #** **Response of cultured cells to hyper- and hypogravity.** A. Tschopp, A. Cogoli (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland), and W. Briegleb (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-109, S-110. Swiss National Science Foundation *Grant No. 3,499-0,79.*

Preliminary results obtained with four cell lines at high-g and with lymphocytes monitored in a fast-rotating clinostat are described. The experiments shown that gravity has an influence on cell growth that is independent of cell line. High-g increases the growth rate, whereas low-g has an inhibitory effect. At high-g, no correlation is found between g-level and cell growth; the high-g effect remains essentially the same at 3-g, 20-g, and 40-g. C.R.

**A82-40774 * #** **Temperature and behavioral responses of squirrel monkeys to 2Gz acceleration.** C. A. Fuller (California, University, Riverside, CA), J. Tremor, J. P. Connolly, and B. A. Williams (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct.2, 1981.) Physiologist, Supplement,* vol. 24, Dec. 1981 (1982), p. S-111, S-112. 6 refs. NSF Grant No. BNS-79-2441; Grant No. PHS-BRD-RR-09070; Contract No. NAS2-10536.

This study examines the responses of squirrel monkeys to acute +2Gz exposure. Body temperature responses of loosely restrained animals were recorded via a thermistor in the colon. Behavioral responses were recorded by video monitoring. After baseline recording at 1G, monkeys were exposed to 2G for 60 min. The body temperature started to fall within 10 min of the onset of centrifugation and declined an average of 1.4 C in 60 min. This is in contrast to a stable body temperature during the control period. Further, after a few minutes at 2G, the animals became drowsy and appeared to fall asleep. During the control period, however, they were alert and continually shifting their gaze about the cage. Thus, primates are susceptible to hypergravic fields in the +Gz orientation. The depression in primate body temperature was consistent and significant. Further, the observed drowsiness in this study has significant ramifications regarding alertness and performance in man. (Author)

**A82-40775 * #** **Gravity perception and asymmetric growth in plants - A model derived from the grass pulvinus.** P. Dayanandan, C. I. Franklin, and P. B. Kaufman (Michigan, University, Ann Arbor, MI). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-113, S-114. Grant No. NAGW-34.

It is pointed out that gravitropic responses in plants involve asymmetric growth. On the basis of the geometry of growth response in grass leaf sheath pulvinus, a general model is proposed for gravitropism in multicellular plant organs. The negative gravitropic response of a pulvinus is a result of cell elongation involving all but the uppermost region of a horizontally placed organ. Whereas the uppermost region does not grow, the lowermost region elongates maximally. The regions between elongate to intermediate extents. An expression is given relating the angle of curvature of the organ to the diameter and initial and final lengths of the organ. It is shown that the response of the individual cells can be expressed as inherent sensitivity to gravitational stimulus according to a particular equation. C.R.

**A82-40776 #** **ADH suppression under immersion combined with dehydration.** H. von Ameln, M. Laniado, L. Röcker, K. Kirsch, H. J. Wicke, and I. Busch (Berlin, Freie Universität, Berlin, West Germany). *(International Union of Physiological Sciences, Annual Meeting, 3rd, Innsbruck, Austria, Sept. 29-Oct. 2, 1981.) Physiologist, Supplement*, vol. 24, Dec. 1981 (1982), p. S-115.

It is assumed that under zero gravity, an increased central blood volume is a concomitant of elevated plasma osmolality. This is seen to present a problem with respect to ADH secretion because, on the one hand, increased plasma osmolality stimulates ADH secretion whereas, on the other, an increase in central blood volume suppresses ADH secretion. The experiment described here involves a regimen of thermal dehydration that is followed by either head-out immersion or chair rest. The immersion is found to lead to a volume shift of about 700 ml into the intrathoracic compartment. Therefore, given high plasma osmolality combined with hypovolemia, after thermal dehydration the maximal stimulatory drive for ADH secretion will be counteracted by immersion. C.R.

**A82-40885 #** **Human factor and flight safety.** J. C. Wanner. In: International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings. Volume 1. New York, American Institute of Aeronautics and Astronautics, 1982, p. 83-96.

Design considerations developed to assist human operators of the Concorde in emergency situations are explored for principles which may be extended to other complex machine control design problems. Noting that with complex machinery, no one factor can nominally be identified as the only cause of an accident, each accident is considered to be a chain of events. In-flight accidents occur because of pilotability incidents, aircraft control sensitivity to perturbation incidents, and maneuverability incidents, which may have to do solely with changing the functional status of the aircraft. Characteristics of human attentiveness, a natural inclination to search fo; data, and the ability to compensate for an altered workload are outlined. Recommendations are given that information relayed by instruments be useful, that information follow anticipation, alarms be easy to identify, and that necessary appropriate actions be limited in number. M.S.K.

**A82-41122 *** **Ultrasonic determination of thermodynamic threshold parameters for irreversible cutaneous burns.** J. H. Cantrell, Jr. (NASA, Langley Research Center, Hampton, VA). *Acoustical Society of America, Journal*, vol. 72, Aug. 1982, p. 337-339. 10 refs.

In vivo ultrasonic measurements of the depth of conductive cutaneous burns experimentally induced in anesthetized Yorkshire pigs are reported as a function of burn time for the case in which the skin surface temperature is maintained at 100 C. The data are used in the solution of the one-dimensional heat diffusion equation with time-dependent boundary conditions to obtain the threshold temperature and the energy of transformation per unit mass associated with the transition of the tissue from the state of viability to the state of necrosis. The simplicity of the mathematical model and the expediency of the ultrasonic measurements in studies of thermal injury are emphasized. (Author)

**A82-41195** **Molecular basis for the genetic code.** M. Shimizu (Tokyo, University, Tokyo, Japan). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 297-303. 30 refs.

It was found by using the CPK molecular model that holes on the complexes of four nucleotides (C4N) on the tRNAs, namely complexes of the anticodon bases with the discriminator base at 4th position of 3' end, had lock and key relations to the corresponding protein amino acids. Various general features of the universal and mitochondrial genetic codes were easily explained in terms of the C4N model. The recognition mechanism of the tRNA by the aminoacyl-tRNA-synthetase is closely correlated with the formation of the C4N on the Rossmann fold on the synthetase. The meaning of the hypermodification of the tRNA base next to the third anticodon base and other phenomena were also discussed. (Author)

**A82-41196 *** **Chemical evolution. XL - Clay-mediated oxidation of diaminomaleonitrile.** J. P. Ferris, W. J. Hagan, Jr., K. W. Alwis, and J. McCrea (Rensselaer Polytechnic Institute, Troy, NY). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 304-309. 30 refs. NSF Grant No. 79-24364; Grant No. NGR-30-018-148.

The inhibition of the oligomerization of HCN by montmorillonite clays is shown to be caused by oxidation of diaminomaleonitrile (DAMN) by ferric ion in the clay lattice, with ferrous ion and oxalic acid the reaction products. It is demonstrated that diminosuccinonitrile is the initial reaction product and is rapidly hydrolized to oxalic acid and HCN. The same oxidative transformations are effected by ferric ion bound to Dowex 50, ferric ion in solution, and Ni(NH3)6(2+). The rate of reaction of DAMN indicates no catalytic role for the clay in the oxidation of DAMN, and little reaction of the latter was observed with montmorillonite in which the bulk of the iron was in the divalent state. The possible significance of these redox reactions to chemical evolution is discussed. C.D.

**A82-41197** **The radiolysis of aqueous propionitrile - Compounds of interest to chemical evolution studies.** S. Jovanovic, V. Spiric (Institut za Nuklearne Nauke, Belgrade, Yugoslavia), S. Neskovic (Beograd, Univerzitet, Belgrade, Yugoslavia), Z. Draganic, and I. Draganic (Universidad Nacional Autónoma de México, Villa Oregón, Mexico). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 337-343. 11 refs.

Oxygen-free aqueous solutions of CH3CH2CN (0.1 M, pH 6) were exposed to gamma rays from a Co-60 source and the mixture of radiolytic products fractionated. The separated fractions were analyzed by magnetic resonance methods (EPR, NMR), spectrophotometry (UV-VIS-IR), gas chromatography and amino acids analysis. About 70 percent of radiolytic products consist of nonvolatile material. A large variety of compounds was detected: propionaldehyde, acetaldeyde, sixteen carboxylic acids and, in the hydrolysate, eleven protein and nonprotein amino acids. About 20 percent of the nonvolatile radiolytic products have a hydrophobic character and can be extracted with chloroform. Among them is a long-living nitroxide free radical which is stable for months at room temperature. It has been suggested that the nitroso compounds are formed as radiolytic products, and that they act as spin-traps by converting some of the short living radicals to the observed nitroxide radical. This and other experimental findings are discussed in the light of free radical reactions induced by ionizing radiation. (Author)

**A82-41198** **A model for the origin of life.** F. J. Dyson (Institute for Advanced Study, Princeton, NJ). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 344-350. 12 refs.

A simple statistical model is constructed, describing the transition from disorder to order in a population of mutually catalytic molecules undergoing random mutations. The consequences of the model are calculated, and its possible relevance to the problem of the origin of life is discussed. The main conclusion of the analysis is that the model allows populations of several thousand molecular units to make the transition from disorder to order with resonable probability. (Author)

**A82-41199** **Acceleration of HCN oligomerization by formaldehyde and related compounds - Implications for prebiotic syntheses.** A. W. Schwartz and M. Goverde (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 351-353. 17 refs.

Formaldehyde and other simple carbonyl compounds are known to react rapidly with HCN in aqueous solution to produce the corresponding cyanohydrin compounds. It is observed that these cyanohydrins markedly accelerate the rate of HCN oligomerization, both in homogeneous solution as well as in the frozen state. These results, for which a tentative mechanism is suggested, significantly extend the possible range of conditions for HCN oligomerization on the prebiotic earth. (Author)

**A82-41200 *** **Formation of the thioester, N-acetyl, S-lactoylcysteine, by reaction of N-acetylcysteine with pyruvaldehyde in aqueous solution.** A. L. Weber (Salk Institute for Biological Studies, San Diego, CA). *Journal of Molecular Evolution*, vol. 18, July 1982, p. 354-359. 50 refs. Grant No. NsG-7627.

N-acetylcysteine reacts efficiently with pyruvaldehyde (methylglyoxal) in aqueous solution (pH 7.0) in the presence of a weak base, like imidazole or phosphate, to give the thioester, N-acetyl, S-lactoylcysteine. Reactions of 100 mM N-acetylcysteine with 14 mM, 24 mM and 41 mM pyruvaldehyde yield, respectively, 86%, 76% and 59% N-acetyl, S-lactoylcysteine based on pyruvaldehyde. The decrease in the percent yield at higher pyruvaldehyde concentrations suggests that during its formation the thioester is not only consumed by hydrolysis, but also by reaction with some substance in the pyruvaldehyde preparation. Indeed, purified N-acetyl, S-lactoylcysteine disappears much more rapidly in the presence of pyruvaldehyde than in its absence. Presumably, N-acetyl, S-lactoylcysteine synthesis occurs by rearrangement of the hemithioacetal of N-acetylcysteine and pyruvaldehyde. The significance of this pathway of thioester formation to molecular evolution is discussed. (Author)

**A82-41206** **Ventilatory and heart rate responses to hypoxia and hypercapnia during sleep in adults.** L. L. Hedemark and R. S. Kronenberg

(Minnesota, University, Minneapolis, MN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 307-312. 24 refs.

**A82-41207 Altitude-induced changes in plasma thyroxine, 3,5,3 prime-triiodothyronine, and thyrotropin in rats.** J. M. Connors (Illinois, University, Chicago, IL) and L. G. Martin (Peoria School of Medicine, Peoria, IL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 313-315. 21 refs. Grant No. NIH-5-S01-RR-05369-12.

The thyroid function of high-altitude-acclimated (6,900 m for 5 wk) and nonaltitude-acclimated control (198 m) rats was studied. After 5 wk of high-altitude exposure the plasma concentrations of both thyroxine (T4) and triiodothyronine (T3) were lower than those in control rats (4.7 + or - 0.3 vs. 3.3 + or - 0.2 micrograms/dl and 96 + or - 5 vs. 74 + or - 6 ng/dl, respectively). The plasma thyrotropin (TSH) concentration was elevated in the high-altitude-acclimated rats compared with controls (52 + or - 4 vs. 29 + or - 3 micrograms/dl, respectively). Gross anatomical (thyroid wt/body wt) and histological observations of thyroid tissue were consistent with elevated plasma TSH concentrations. These results suggest that the fall in the plasma concentrations of T4 and T3 during acclimation to severe hypoxia is due to a primary block of thyroid secretion and not to a fall in plasma TSH levels. (Author)

**A82-41208 Effect of heating rate on evaporative heat loss in the microwave-exposed mouse.** C. J. Gordon (U.S. Environmental Protection Agency, Experimental Biology Div., Research Triangle Park, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 316-323. 28 refs.

Mice were exposed to microwave radiation at 2.450 MHz at varying intensities and heat loads to determine if the animals thermoregulate or temperature regulate in conditions of varying heat load. The mice were exposed to whole-body doses of microwave radiation and power not reflected back was regarded as absorbed by the mouse. Incident powers of three to six watts were used, resulting in specific absorption rates of 47.4-93.4 W/kg. Deep body temperatures and the evaporated heat loss were monitored, and results demonstrated that mice thermoregulate, i.e., dissipate heat loads through evaporative heat loss at a rate which is modeled numerically. It is concluded that a significant portion of the microwave energy is deposited internally. M.S.K.

**A82-41209 * Hindlimb immobilization - Length-tension and contractile properties of skeletal muscle.** F. A. Witzmann, D. H. Kim, and R. H. Fitts (Marquette University, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 335-345. 32 refs. Grant No. NIH-AM-22037; Contract No. NAS9-15711.

Casts were placed around rat feet in plantar flexion position to immobilize the soleus muscle in a shortened position, while the other foot was fixed in dorsal flexion to set the extensor digitorum longus in a shortened position. The total muscular atrophy and contractile properties were measured at 1, 2, 4, 7, 14, 21, 28, 35, and 42 days after immobilization, with casts being replaced every two weeks. The slow twitch soleus and the fast-twitch vastus lateralis and longus muscles were excised after termination of the experiment. The muscles were then stretched and subjected to electric shock to elicit peak tetanic tension and peak tetanic tension development. Force velocity features of the three muscles were assayed in a series of afterloaded contractions and fiber lengths were measured from subsequently macerated muscle. All muscles atrophied during immobilization, reaching a new steady state by day 21. Decreases in fiber and sarcomere lengths were also observed. M.S.K.

**A82-41210 Pulmonary stretch receptor discharge patterns in eupnea, hypercapnia, and hypoxia.** S. Iscoe (Queen's University, Kingston, Ontario, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 346-354. 31 refs. Research supported by the Medical Research Council of Canada.

**A82-41211 Leucine and urea metabolism in acute human cold exposure.** R. D. Goodenough, G. T. Royle, E. R. Nadel, M. H. Wolfe, and R. R. Wolfe (Harvard University; Massachusetts General Hospital; Shriners Burns Institute, Boston, MA; John B. Pierce Foundation, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 367-372. 25 refs. Grants No. NIH-GM-00455-03; No. NIH-GM-21700-07; No. NIH-GM-007-035.

Four healthy males voluntarily underwent acute cold exposure at 10 C. Metabolic rate doubled for the 100-min exposure. (1-carbon-13) leucine and (nitrogen-15) urea were used as tracers of protein metabolism via a primed constant infusion. Total and plasma transported leucine oxidation approximately doubled, but the oxidation of leucine derived from protein in the tissue where oxidation occurred ('intracellular oxidation') did not change as it did when the same subjects underwent mild exercise. Rate of appearance of urea and leucine in plasma were not significantly different between control and cold. Although the rate of protein synthesis calculated from the leucine data did not change, the rate of catabolism increased. Net protein catabolism based on the urea data agreed well with the leucine data at rest but did not exhibit a significant increase during exposure. However, net protein catabolism based on the leucine data did increase significantly during acute cold exposure. (Author)

**A82-41212 Effect of warm-up on left ventricular response to sudden strenuous exercise.** C. Foster, D. S. Dymond, J. Carpenter, and D. H. Schmidt (Wisconsin, University; Mount Sinai Medical Center, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 380-383. 22 refs.

Twenty male subjects divided into groups of ten performed bicycle exercise, one group using warm-up of an incremental work-load type, to determine if left ventricular ejection fraction (LVEF) could be normalized in its response to the onset of strenuous exercise. The subjects were monitored by ECG, for blood pressure, and with radionuclide angiography, and a variance analysis for a groups-by-trial design was performed with the data. The warm-ups were found to significantly affect the left ventricular response to sudden strenuous exercise (SSE), although the responses were never normalized. The ECG data is cited to demonstrate that the lack of complete normalization is due to ischemic responses to the SSE, which may be secondary to a delay in autoregulation of coronary blood flow during SSE. M.S.K.

**A82-41213 Neuromuscular adaptation in human thenar muscles following strength training and immobilization.** D. G. Sale, A. J. McComas, J. D. MacDougall, and A. R. M. Upton (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 419-424. 30 refs. Research supported by the Muscular Dystrophy Association of Canada.

The effects of strength training and limb immobilization on the human thenar muscles were investigated in 11 healthy subjects. One group (n = 6) trained prior to immobilization and a second group (n = 5) underwent immobilization prior to training. Measurements made in the control condition and following the two experimental conditions included voluntary isometric strength, motor-unit counts, motor nerve conduction velocity, reflex potentiation, and isometric twitch-contraction properties. When the results of both groups were combined an average of 5 wk of immobilization was found to cause a significant decrease in voluntary strength (42%, P less than 0.05) and reflex potentiation (37%, P less than 0.01) in relation to the control condition. Training caused an increase (40%, P less 0.05) in voluntary strength and a decrease in twitch tension (25%, p less than 0.01) and contraction time (8%, P less than 0.05). Training prior to immobilization provided a reserve of neuromuscular function, which attenuated the effect of immobilization in relation to the control condition. It was concluded that neural as well as muscular adaptation occurred in response to immobilization. (Author)

**A82-41214 In vivo and in vitro characteristics of eccrine sweating in patas and rhesus monkeys.** C. V. Gisolfi, K. Sato, P. T. Wall, and F. Sato (Iowa, University, Iowa City, IA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 425-431. 25 refs. Grant No. NIH-5-R01-NS-14745-03; Contract No. N00014-75-C-0597.

**A82-41215 Metabolic and cardiovascular adaptations in trained hypophysectomized rats.** J. G. Edwards, D. D. Lund, T. G. Bedford, C. M. Tipton, R. D. Matthes, and P. G. Schmid (U.S. Veterans Administration Medical Center; Iowa, University, Iowa City, IA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 448-454. 54 refs. Grants No. NIH-HL-21245-05; No. NIH-GM-07045-04.

Two groups of rats, one hypophysectomized, were exposed to progressive treadmill training for 14-17 weeks. The rats were monitored for blood pressure before training and before sacrifice, muscarinic cholinergic receptor density in the heart, and cariovascular responses to lower body negative pressure. The hypophysectomized rats were found to have reduced maximum oxygen uptake and heart rate, both of which increased with endurance training. Blood pressure was lower before training and stayed lower in the rats with the pituitary removed, and decreases in cholinergic receptors were observed in the right atrium of the trained group. It is concluded that significant metabolic and cardiovascular adaptations occur in trained animals deprived of anterior pituitary hormones, but the exact mechanism for individual changes was not determined. M.S.K.

**A82-41216 Relationship between muscle QO2 and fatigue during repeated isokinetic contractions.** J. L. Ivy, W. M. Shermen, J. M. Miller, B. D. Maxwell, and D. L. Costill (Ball State University, Muncie, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 470-474. 31 refs. Grant No. NIH-HL-20408-02.

Two biopsy samples were taken from the vastus lateralis muscles of 13 male subjects, who then performed isokinetic exercizes of lifting a weight through a 90 deg arc using apparatus on a leg exercise bench. Data was gathered on thigh volumes, fatigue limits, the distribution of fast- and slow-twitch muscles in the biopsied muscles, and the muscle respiratory capacities (RC). Subjects with RC above a 2472 microliter O2/hr mean value displayed slower fatigue onset than subjects with RC values below the mean. The maximum aerobic power was correlated with the percent of maximum power and power/ml of fat-free thigh volume. The results indicated that muscle capacity for aerobic metabolism influences the rate of fatigue development, while a correlation between fiber type and fatigue onset was not found. M.S.K.

**A82-41217 Protection from O2 toxicity by preexposure to hypoxia - Lung antioxidant enzyme role.** L. Frank (U.S. Veterans Administration Hospital; Miami, University, Miami, FL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 475-482. 45 refs. Research supported by the U.S. Veterans Administration; Grants No. NIH-HL-26029; No. NIH-HL-20366; No. NIH-HL-22333; No. NIH-HL-07382.

Adult rats, mice, and hamsters were exposed to hypoxic conditions, examined for lung antioxidant enzyme responses to the hypoxia, and tested for tolerance in atmospheres of greater than 95% O2. The animals were initially placed in a 14% O2 environment, with gradual decreases over a 24 hr interval to 10%. Comparisons were made of hypoxia preexposed animals and nonpreexposed animals in terms of lung concentrations of superoxide dismutase (SOD), Protein, and DNA, and the enzymes catalase, glutathione peroxidase, glucose-6-phosphate dehydrogenase. Statistical analyses indicated an increase in lung antioxidant enzyme activities in rats following an exposure to hypoxic conditions, resulting in a tolerance to hyperoxic atmosphere. A further test involving injection of an SOD blocker eliminated the tolerance in rats. Mice and hamsters experienced no increase in hyperoxic tolerance following hypoxic exposure. M.S.K.

**A82-41218 Effect of induced erythrocythemia on hypoxia tolerance during physical exercise.** R. J. Robertson, R. Gilcher, K. F. Metz, G. S. Skrinar, T. G. Allison, H. T. Bahnson, R. A. Abbott, R. Becker, and J. E. Falkel (Pittsburgh, University, Pittsburgh, PA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 490-495. 33 refs.

Five male mountain climbers participated in treadmill exercizes after submitting to phlebotomies for the extraction of red blood cells totaling four units over a 32 wk period. The cells were frozen while the blood plasma was reinjected. The subjects were supplied with 300 mg of ferrous glucanate until reinjected with the stored red blood cells over a two-day period. The subjects then performed treadmill trials while breathing either a normoxic mixture or a hypoxic gas simulating a 3566.2 m altitude. Monitoring comprised heart rate, expired ventilation, ventilatory flow, respiratory rate, and breath O2 and CO2 content, as well as treadmill performance, hematocrit, and hemoglobin blood concentration. The induced erythrocythemia was found to increase normoxic performance by 15.8% and altitude hypoxia exercise output by 8.9%, while both conditions produced a maximal oxygen uptake increase of at least 12%. M.S.K.

**A82-41219 Acid-base, metabolic, and ventilatory responses to repeated bouts of exercise.** M. J. Buono and F. B. Roby (Arizona, University, Tucson, AZ). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Aug. 1982, p. 436-439. 28 refs.

Acid-base, metabolic, and ventilatory responses to sequences of short term, high intensity exercise were examined in ten male subjects performing at a maximal rate on a bicycle ergometer. Maximal work load levels were determined for each subject in alternating 3 min peddling, 3 min rest cycles until exhaustion. Parameters which were monitored included the O2 uptake, CO2 production, respiratory exchange rate, minute ventilation, heart rate, and blood pH, CO2 partial pressure, and lactate content. Dual five minute maximal tests were then run with a 25 min rest between sessions. The 5 min trials revealed that a reciprocal relationship exists between the blood lactate removal rate and bicarbonate build-up during the rest period, and the second trial resulted in lower lactate levels than the first. It is concluded that a period of high intensity exercise can alter acid-base and metabolic responses in succeeding exercizes. M.S.K.

**A82-41230 A nonlinear model combining pulmonary mechanics and gas concentration dynamics.** K. R. Lutchen (Case Western Reserve University, Cleveland, OH), F. P. Primiano, Jr. (Case Western Reserve University; Rainbow Babies and Children's Hospital, Cleveland, OH), and G. M. Saidel (Case Western Reserve University; U.S. Veterans Administration Medical Center, Cleveland, OH). *IEEE Transactions on Biomedical Engineering*, vol. BME-29, Sept. 1982, p. 629-641. 19 refs. Research supported by the U.S. Veterans Administration; Grants No. NIH-HL-07414; No. NIH-AM-08305.

A nonlinear mathematical model is presented which describes the functional relations between pulmonary mechanics and gas concentration dynamics during breathing at various frequencies and volume operating points. Various combinations of parameters are chosen, including cases in which the model is mechanically uniform (normal) and nonuniform (obstructive). Clinical measures of mechanical uniformity and gas concentration inhomogeneity are evaluated along with unobservable indexes. It is shown that for the nonuniform model, the gas is distributed more inhomogeneously at higher frequencies and lower lung volumes; the distribution of initial dead space gas to the compartments as well as pendelluft tend to decrease this inhomogeneity. Dynamic compliance for the nonuniform model is found to be frequency dependent at each of the three volume points investigated, whereas the semilog nitrogen washout curve is essentially linear for some frequencies and volumes and nonlinear for others. V.L.

**A82-41324 Evolution of early mechanisms of translation of genetic information into polypeptides.** H. Kuhn (Max-Planck-Institut für biophysikalische Chemie, Göttingen, West Germany) and J. Waser. *Nature*, vol. 298, Aug. 5, 1982, p. 585, 586. 11 refs.

A model for the development of enzymes from the interactions between helices of hairpin-loop adaptor RNA molecules aligned in parallel in a sequence complementarity to another messenger RNA to promote polypeptide synthesis is presented. Hydrogen bonds from between nucleotides in the hairpin loop and complementary nucleotides in an extended RNA filament, which is attached to another hairpin loop, etc., to form a picket fence arrangement. Hairpin RNAs are precursors to tRNA and the filament is a precursor to mRNA. Primeval conditions are assumed, including the presence of activated nucleotides and amino acids, the existence of periodic temperature changes, and a structurally diversified environment such as porous rocks. Aggregate groups forming in small pores could move to large pores, with growth proceedings by the linkages of the twisted hairpin loops to collector strands. M.S.K.

**A82-41334 † A new hypothesis for the mechanism of muscle contraction (Novaia gipoteza mekhanizma myshechnogo sokrashcheniia).** N. S. Miroshnichenko (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady*, vol. 265, no. 3, 1982, p. 735, 736. 7 refs. In Russian.

The contraction mechanism of a cross-striated muscle is explained in terms of a new model which involves screw-like motion of a thick protofibril inside six hexagonally arranged thin protofibrils whereby the thin protofibrils are turned onto the thick protofibril in the same way as a nut onto a screw. Experimental data which support this hypothesis are briefly discussed. In particular, the proposed hypothesis accounts for the presence of two identical heads in the myosin molecule. V.L.

**A82-41445 # Mode of mutual influence of stimulation-characteristics in the visual processing system (Art und Ort der gegenseitigen Beeinflussung von Reizmerkmalen in der visuellen Informationsverarbeitung - Ein empirischer Vergleich der Modelle von Estes sowie Shiffrin und Geisler).** D. Lange. *Braunschweig, Technische Universität, Naturwissenschaftliche Fakultät, Doktor der Naturwissenschaften Dissertation, 1980.* 145 p. 31 refs. In German.

The results of an investigation of perceptual independence of stimulation characteristics in the human visual system are presented. The sensory models of Estes (1972) and of Shiffrin and Geisler (1973) are presented and their validity tested. The study takes into account independent variables such as similarity, separation, and position as well as dependent ones and analyzes stimulative material. The independence of the statistical findings from the independent variables is evaluated. C.D.

**A82-41450 # On the observability of electrical cardiac sources.** A. A. H. Damen. Eindhoven, Technische Hogeschool, Doctor in de technische Wetenschappen Dissertation, 1980. 259 p. 184 refs. Research supported by the Nederlandse Hartstichting.

The observability of electrical cardiac sources is investigated based on noninvasive measurements, focusing on the identification of pericardial potentials which can be used to formulate the fundamental field-theory constraints caused by the geometrical configuration in order to provide a proper modelling of the system. As an initial approximation of the skin potential patterns, the torso is modelled as being homogeneous, and a simple simulation of the electrical heart action is developed and analyzed experimentally. The distribution of the electrode positions on the skin is optimized by means of spherical projection methods, resulting in a balanced plot of equipotentials. Both the simulated data and the actual measurements are used to identify the corresponding sources by means of three approaches: multiple dipoles, the multipolar approach, and a singular value decomposition. Of the three models tested, only the singular value decomposition provides sufficient, unambiguous estimations of the transfer relating pericardial potentials to skin potentials. Using this approach, about 66 patterns on the pericard are obtained, which form a complete set for all possible potential distributions. In addition, the observable skin patterns are found to have a high correlation with the principal components of the measured skin potential distribution. N.B.

**A82-41458 † The potential of radionuclide diagnosis of acute myocardial infarction (Vozmozhnosti radionuklidnoi diagnostiki ostrogo infarkta miokarda).** V. N. Zakharov, V. K. Sychev, N. M. Sukhanova, and V. V. Kovalev. *Sovetskaia Meditsina*, no. 6, 1982, p. 3-6. 16 refs. In Russian.

Clinical tests have been conducted to evaluate the effectiveness of Tc-99-pyrophosphate scintigraphy in diagnosing acute myocardial infarction. Results indicate that this technique is useful in complicated cases involving arrhythmias and conductivity disturbances as well as atypical infarctions with negative ECG picture. The method is found to be of particular value in diagnosing transmural and large-focus myocardial infarctions. V.L.

**A82-41459 † Functional properties of T-lymphocytes in patients with acute myocardial infarction (Funktsional'nye svoistva T-limfotsitov u bol'-**

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**nykh v ostrom periode infarkta miokarda).** I. M. Korochkin, I. I. Chukaeva, S. S. Kirzon, and I. I. Selivanov (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Sovetskaia Meditsina,* no. 6, 1982, p. 6-9. 11 refs. In Russian.

**A82-41460 † Diurnal dynamics of the indicators of the capacity for physical work and of physiological functions (Vnutrisutochnaia dinamika pokazatelei fizicheskoi rabotosposobnosti i fiziologicheskikh funktsii).** L. Ia. Glybin (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Sovetskaia Meditsina,* no. 6, 1982, p. 10-13. 13 refs. In Russian.

It is pointed out that no clear notion exists of the periodicity during the day of the physiological processes that determine the time dependence of a person's capacity for work. Experiments are carried out on 111 subjects (78 men and 33 women) ranging in age from 18 to 45. Work capacity is evaluated with a dynamometer that measures the strength of a hand squeeze. Endurance is evaluated by measuring the time that a given strength of squeeze can be maintained. These indicators of the capacity for physical work are found to reach a maximum at the following times of day: 5 a.m., noon, 4 p.m., 8 p.m., and midnight. These are also the optimum times for the indicators of such physiological factors as arterial pressure, body temperature, frequency of heart contractions, frequency of respiration, breathing capcity, and time between inhalation and exhalation. C.R.

**A82-41461 † Dyspnea - What is it (Chto takoe odyshka).** A. G. Dembo (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Sovetskaia Meditsina,* no. 6, 1982, p. 53-56. 26 refs. In Russian.

It is contended that subjective criteria by themselves are insufficient for a diagnosis. Individual responses may differ and a person who has become accustomed to the condition will be less sensitive to it. In some cases, however, dyspnea actually is purely subjective, there being no actual impairment of respiration; in others the condition is present without the person's awareness. Dyspnea is defined here as labored and/or altered breathing, the first being manifested through a sensation, the second through actual changes in the indicators of external respiration. In most cases, the two occur together. A distinction is drawn between physiological and pathological dyspnea. C.R.

**A82-41462 † Hygienic evaluation of an 8-mm-wave electromagnetic field (Gigienicheskaia otsenka elektromagnitnogo polia 8-millimetrovykh voln).** Iu. D. Dumanskii and L. A. Tomashevskaia (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Gigiena i Sanitariia,* June 1982, p. 18-20. In Russian.

A study has been carried out to investigate the effect of 8-mm-wave electromagnetic fields of 140, 100, and 60 microwatt/sq cm produced by meteorological radars on certain metabolic functions in animals. A relationship is established between metabolic disturbances, on the one hand, and the energy flux density and exposure time, on the other hand. It is recommended to use the findings of the study as the basis for hygienic regulation of electromagnetic fields in residential areas. V.L.

**A82-41463 † Tritium oxide distribution and excretion kinetics in the exposure of animals to noise (Raspredelenie i kinetika vyvedeniia okisi tritiia pri vozdeistvii shuma na organizm zhivotnykh).** M. M. Tsapkov and N. S. Kaliazina. *Gigiena i Sanitariia,* June 1982, p. 29-31. In Russian.

The effect of noise (100-103 dB, 500 Hz) on the uptake of tritium oxide in various tissues of rats, as well as the kinetics of tritium oxide excretion, is investigated. The experimental animals are intraperitoneally administered single injections of tritium oxide, and exposed to noise for three hours each day for up to 256 days, and the isotope content in the aqueous phases of the brain, lungs, muscles, skin, and blood is determined. Results show that the isotope content in all of the tissues studied is higher after 2, 4, 64, 128, and 256 days of exposure to noise than for control groups not exposed to noise. By the 256th day of exposure to noise, the levels of tritium in these organs are two to four times higher than in the corresponding organs of the control animals. In addition, the rate of isotope excretion from the aqueous phase and dry residue of the test organs is found to be slower for the experimental animals than for the control ones. N.B.

**A82-41464 † A hygienic evaluation of the biological effects of nonionizing microwave radiation (K gigienicheskoi otsenke biologicheskogo deistviia neioniziruiushchikh mikrovolnovykh izluchenii).** V. S. Belokrinitskii (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Gigiena i Sanitariia,* June 1982, p. 32-34. 7 refs. In Russian.

The effects of nonionizing microwave radiation of various intensities and durations are investigated for rats, dogs, and cats. Analyses of histochemical indices (such as the content of glycogen, neutral fats, nucleic acids, chromatin, and the activities of the enzymes succinic dehydrogenase, malate dehydrogenase, lactate dehydrogenase, and glucose-6-phosphate dehydrogenase) and ultrastructural changes in cells of the brain and spinal cord, heart, and kidneys show that the animals studied have a high sensitivity to microwave radiation with wavelengths of about 12.6 cm. In addition, it is determined that the changes in the histochemical indices and the ultrastructural alterations are correlated with the intensity and duration of the microwave radiation, as well as with the tissue assay period and the specific functions of the cells studied. Attention is also given to the limits of the histochemical and structural transformations in the cells, tissues, and organs which show morphological changes under the influence of microwave radiation. N.B.

**A82-41465 † The assimilation of vitamin C in seamen during voyages at high latitudes (C-vitaminnaia obespechennost' organizma moriakov pri plavanii v vysokikh shirotakh).** V. S. Novikov and V. P. Petrov. *Gigiena i Sanitariia,* June 1982, p. 78, 79. In Russian.

The tissue saturation of vitamin C in seamen is investigated, along with the effect of increased doses of ascorbic acid during voyages at high latitudes in the spring and fall. Seamen whose tissue saturation before the voyage is good or satisfactory do not suffer a decrease in the amount of vitamin C absorbed into the tissue in voyages during the spring. In the fall, the content of the vitamin in the tissues is found to fall off in proportion to the length of the voyage. Additional doses of vitamin C are recommended for voyages in the fall. The Rotter (1937) method is used for determining vitamin content. C.R.

**A82-41466 † The effect of the natural and climatic conditions of the Far North on the human cardiovascular system (Vliianie prirodno-klimaticheskikh faktorov Krainego Severa na sostoianie serdechno-sosudistoi sistemy cheloveka).** I. I. Dedenko, B. V. Ustiushin, B. M. Stolbun, and O. G. Novikova (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena i Sanitariia,* June 1982, p. 79-81. 12 refs. In Russian.

**A82-41467 † The incorporation of P-32 into various sections of the brain upon exposure to intermittent noise of low intensity (Vkliuchenie 32R v razlichnye otdely golovnogo mozga pri vozdeistvii preryvistogo shuma maloi intensivnosti).** N. F. Svadkovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena i Sanitariia,* June 1982, p. 87, 88. In Russian.

White male rats are subjected to intermittent noise for two hours each day for 18, 54, and 90 days. The two-hour session comprises alternating 15-minute periods of noise and silence. The intensity of the noise is 60 dB, and the frequency is in the range 50-5000 Hz. The number of sections of the brain in which an increase is observed in the coefficient of isotope accumulation and the coefficient of relative organ activity is found to depend on the total time of exposure to the noise. When P-32 is introduced before the two-hour session, a significant accumulation of the isotope is observed in various sections of the brain. The more pronounced shifts observed when the isotope is introduced before the noise are seen as suggesting that the changes occur principally through the direct action of the noise. C.R.

**A82-41468 † Biochemical aspects of the mechanism by which cholinolyptics affect the brain (Biokhimicheskie aspekty mekhanizma deistviia kholinolitikov na mozg).** S. S. Krylov and E. V. Semenov (Ministerstvo Zdravookhraneniia SSSR, Institut Toksikologii, Leningrad, USSR). *Uspekhi Sovremennoi Biologii,* vol. 93, May-June 1982, p. 397-408. 116 refs. In Russian.

It is shown that the blocking of postsynaptic choline receptors produces changes in neuromediator metabolism, ion transport, and ferment activity. It is emphasized that one of the essential factors determining the effect of cholinolytics on the presynaptic structures of the brain nerve endings is a change in the permeability of the membranes with respect to electrolytes. It is suggested that liberation and retention of neuromediators in tissue in the presence of cholinolytics and due to the effect of neuromediators and their mimetics (agonists) are largely determined by the ratio of Ca(2+) and Mg(2+). V.L.

**A82-41469 † Myosatellocytes and cambial properties of skeletal and muscular tissue (Miosatellitotsity i problema kambial'nosti skeletonomyshechnoi tkani).** R. K. Danilov and A. A. Klishov (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Uspekhi Sovremennoi Biologii,* vol. 93, May-June 1982, p. 409-420. 85 refs. In Russian.

**A82-41470 † The structure and function of macrophages (Struktura i funktsii makrofagov).** Iu. I. Afanas'ev, V. I. Nozdrin, M. Z. Bakhshinian, and V. L. Goriachkina (I Moskovskii Meditsinskii Institut, Moscow, USSR; Erevanskii Meditsinskii Institut, Yerevan, Armenian SSR). *Uspekhi Sovremennoi Biologii,* vol. 93, May-June 1982, p. 421-432. 139 refs. In Russian.

Macrophages are defined as mononuclear myeloid cells whose cytoplasm is characterized by a moderately developed synthesizing apparatus and a well-developed complex of lysosomes. The cells typically have a well-developed periphery that provides for phagocytosis, pinocytosis, secretion, and motion. The population of macrophages is not uniform, differing in functional and morphological respects. This heterogeneity is a reflection of the different stages of the cells in the life cycle. The principal biological function of macrophages is to support, together with other cells, immune homeostasis. C.R.

**A82-41471 † Microcalorimetry in biomedical investigations (Mikrokalorimetriia v mediko-biologicheskikh issledovaniiakh).** A. Sh. Zaichik and L. P. Churilov (Ministerstvo Zdravookhraneniia RSFSR, Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR). *Uspekhi Sovremennoi Biologii,* vol. 93, May-June 1982, p. 448-465. 210 refs. In Russian.

The principles, achievements, and prospects of the biological-reaction microcalorimetry used in investigating biochemical systems, cells, organs, and immunological reactions are surveyed. Attention is given to microcalorimetric investigations on the cellular level and to the calorimetry of subcellular structures. C.R.

**A82-41472 † Optimization of medicinal electrophoresis (Vorrosy optimizatsii lekarstvennogo elektroforeza).** I. E. Oranskii, L. I. Baichorova, and V. S. Ulashchik (Belorusskii Institut Usovershenstvovaniia Vrachei, Minsk, Belorussian SSR; Sverdlovskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Sverdlovsk, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 9-12. 6 refs. In Russian.

Methods for increasing the efficiency of medicinal electrophoresis are briefly discussed. In particular, attention is given to techniques for increasing skin permeability, the use of pulsed current (particularly, sinusoidal current), biological synchronization, and parametric optimization. V.L.

**A82-41473 † The use of an audio-frequency magnetic field in certain diseases (Primenenie magnitnogo polia zvukovogo diapazona pri nekotorykh zabolevaniiakh).** A. G. Kakuliia, L. A. Abuladze, L. G. Glonti, M. N. Melikishvili, and L. S. Urpanishvili (Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Tbilisi, Georgian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 18-21. In Russian.

Clinical data on 60 patients suffering from obliterating atherosclerosis of the lower extremities and 30 patients with osteoarthrosis deformans indicate that a course of treatment with an audio-frequency magnetic field can be effective in such cases. Apart from general clinical improvement, the treatment normalizes lipid metabolism and improves peripheral circulation and muscular function of the extremities in obliterating atherosclerosis, and normalizes the total content of chondroitin sulfate and its fractions in patients with osteoarthrosis deformans. V.L.

**A82-41474 † Thermal pulsation - Techniques, demonstration, and clinical application (Teplovaia pul'satsiia - Metodiki, obosnovaniia i primenenie v klinike).** V. A. Likhtenshtein (Dagestanskii Meditsinskii Institut, Makhachkala, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 21-25. 10 refs. In Russian.

Devices for generating thermal pulses and techniques used in thermal pulsation therapy are briefly reviewed. Data demonstrating the clinical effectiveness of thermal pulsation applied to the nasolabial reflexogenic area are presented and physiological mechanisms underlaying the effect of thermal pulsation are discussed. V.L.

**A82-41475 † Application of laser therapy to patients with osteoarthrosis deformans (Primeneniie lazernoi terapii bol'nykh deformiruiushchim osteoartrozom).** I. L. Pshetakovskii, T. V. Shutova, and Z. G. Ostashkova (Odesskii Institut Kurortologii, Odessa, Ukrainian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 25-29. 8 refs. In Russian.

Clinical and immunologic studies on patients with primary osteoarthrosis deformans have shown that laser therapy employing an 6-mm, 25-mW He-Ne laser (632 A) produces clinical improvement along with favorable changes in muscular function, peripheral hemodynamics, vegetovascular reactions, and immunologic reactivity. In two thirds of the patients observed, the improvement lasted for 6-12 months following the treatment; in one third of the patients, it lasted for 13-18 months. In most cases, the therapeutic effect became particularly noticeable 1-3 months after the treatment. V.L.

**A82-41476 † The effect of ultrasound and phonophoresis of gangliobiockers on the cardiovascular system in patients with cervical osteochondrosis (Vliianie ul'trazvuka i fonoforeza gangliobiokatorov na serdechno-sosudistuiu sistemu bol'nykh sheinym osteokhondrozom).** D. L. Vashkevich (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 29-34. 6 refs. In Russian.

**A82-41477 † Dynamics of the brain electric activity in patients with cerebral insults under the effect of muscle stimulation with sinusoidal modulated currents (Dinamika elektricheskoi aktivnosti mozga u bol'nykh s tserebral'nymi insul'tami pod vliianiem elektrostimuliatsii myshts sinusoidal'nymi modulirovannymi tokami).** G. E. Bagel', S. E. Ginzburg, and N. S. Katernoga (Belorusskii Institut Usovershenstvovaniia Vrachei, Minsk, Belorussian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 37-40. 8 refs. In Russian.

**A82-41478 † The use of electrovacuum therapy in certain diseases of the peripheral nervous system (Primenenie elektrovakuumnoi terapii pri nekotorykh zabolevaniiakh perifericheskoi nervnoi sistemy).** L. L. Luts (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR) and E. A. Roode (Tartuskaia Klinicheskaia Bol'nitsa, Tartu, Estonian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 40-43. 7 refs. In Russian.

**A82-41479 † Electrical stimulation of the urinary bladder following radical surgery for cancer of the rectum (Elektrostimuliatsiia mochevogo puzyria posle radikal'nykh operatsii po povodu raka priamoi kishki).** E. V. Dorogova, E. L. Ozhiganov, and Iu. F. Bagirov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 43-46. 10 refs. In Russian.

**A82-41480 † Sources of an artificial magnetic field for implantation /experimental study/ (Istochniki iskustvennogo magnitnogo polia dlia implantatsii /eksperimental'noe issledovanie/).** A. M. Demetskii and G. V. Lud (Vitebskii Meditsinskii Institut, Vitebsk, Belorussian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 53-55. In Russian.

The effect of the implantation of a resolving magnetic field source on blood vessels and surrounding tissue during the autoplasty of the carotid artery is studied. In experiments carried out on dogs, it is found that the resolving field source (collagen sponge) prevents activation of blood clotting. The changes that occur in the blood strengthen the body's defensive reactions. C.R.

**A82-41481 † Present-day magnetic-field sources, used in medical treatment (Sovremennye istochniki magnitnogo polia, primeniaemye dlia lecheniia).** G. R. Solov'eva (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June 1982, p. 62-65. 20 refs. In Russian.

**A82-41482 † A device for producing the action of static magnetic fields on biological objects (Ustroistvo dlia vozdeistviia postoiannym magnitnym polem na biologicheskie ob'ekty).** M. S. Golinskaia and G. D. Kozlov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* May-June, 1982, p. 65, 66. In Russian.

**A82-41483 † The significance of postextrasystolic potentiation in the preoperative assessment of the reversal of left-ventricle asynergy in patients with ischemic heart disease (Znachenie postekstrasistolicheskogo potentsirovaniia v dooperatsionnoi otsenke obratimosti asinergii levogo zheludochka u bol'nykh ishemicheskoi bolezn'iu serdtsa).** Ia. E. Ekha, A. R. Leissoo, and O. A. Lukha (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Kardiologiia,* vol. 22, June 1982, p. 10-14. 16 refs. In Russian.

**A82-41484 † The ultrastructure of the myocardium in the restorative period following aorto-coronary shunting in patients with chronic ischemic heart disease (Ul'trastruktura miokarda v vosstanovitel'nyi period posle aortokoronarnogo shuntirovaniia u bol'nykh khronicheskoi ishemicheskoi bolezn'iu serdtsa).** G. D. Kniazeva, G. F. Sheremet'eva, and A. A. Martynov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 22, June 1982, p. 18-23. 14 refs. In Russian.

**A82-41485 † A modification of Souns' method of selective coronarography (Modifikatsiia metoda selektivnoi koronarografii po Sounsu).** B. E. Shakhov (Klinika Gospital'noi Khirurgii, Gorki, USSR). *Kardiologiia,* vol. 22, June 1982, p. 37-40. 6 refs. In Russian.

In contrast to Souns's original method, in the present modification the catheter is introduced through the axillary artery and thy working tip of the catheter is U-shaped. These changes make the method more reliable and shorten the time of the procedure. B.J.

**A82-41486 † The amplitude of the R wave and the contractile function of the left ventricle in patients with ischemic heart disease (Amplituda zubtsa R i sokratitel'naia funktsiia levogo zheludochka u bol'nykh ishemicheskoi bolezn'iu serdtsa).** N. K. Furkalo and M. I. Lutai (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Kardiologiia,* vol. 22, June 1982, p. 44-50. 21 refs. In Russian.

**A82-41487 † Immunological reactions to lipoproteins and heparin in young men with a hereditary tendency to atherosclerosis (Immunologicheskie reaktsii k lipoproteidam i geparinu u molodykh muzhchin s otiagoshchennoi po ateroskierozu nasledstvennost'iu).** I. S. Golod, S. S. Barats, and S. I. Plotnikova (Sverdlovskii Meditsinskii Institut; Ministerstvo Zdravookhraneniia RSFSR, Sverdlovskii Institut Kurortologii i Fizioterapii, Sverdlovsk, USSR). *Kardiologiia,* vol. 22, June 1982, p. 58-61. 15 refs. In Russian.

**A82-41488 † The effect of diethylamine analog of ethmozine on the functional condition of myocardium /Clinical and experimental study/**

**(Vliianie dietilaminovogo analoga etmozina na funktsional'noe sostoianie miokarda /Kliniko-eksperimental'noe issledovanie/).** L. V. Rozenshtraukh, N. V. Kaverina, E. P. Aniukhovskii, S. A. Dremin, G. G. Beloshapko, and Kh. Kh. Shugushev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, June 1982, p. 72-78. 23 refs. In Russian.

Diethylamine analog of ethmozine (DAA ethmozine) administered intravenously in doses of 0.5-1 mg/kg, which result in marked antiarrhythmic effects under both clinical and experimental conditions, is found to have little effect on arterial pressure and myocardial contractility, while producing statistically insignificant depression of the automatism of the sinus node and conductive system fibers. DAA ethmozine increased the duration of the refractory periods of the atria and atrioventricular node by 20-30%; it also increased the time of stimulation conduction at all levels of the heart conductive system. It is concluded that the drug might be effective in the treatment of cardiac arrhythmias. V.L.

**A82-41489** † **The rate of coronary perfusion as a factor determining the extent to which the contractile function of the heart is decreased in energy formation disorders (Skorost' koronarnoi perfuzii kak faktor, opredeliaiushchii stepen' umen'sheniia sokratitel'noi funktsii serdtsa pri narushenii energoobrazovaniia).** N. A. Novikova, E. S. Solomatina, and V. I. Kapel'ko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, June 1982, p. 78-82. 17 refs. In Russian.

Experiments on the isolated hearts of guinea pigs show that administration of dinitrophenol in concentrations of 0.01-0.10 mmol produce a decrease in the pressure of a latex balloon placed into the left ventricle and an increase in the shift of the ST segment of the ECG. It is shown that the extent to which the contractile function of the heart is depressed in energy formation disorders and restored during reoxygenation is largely determined by the coronary flow rate. This effect is explained in terms of changes in the concentration of extracellular K(+) and other metabolites. V.L.

**A82-41490** † **The effect of leienkephalin and thyrosine on the lymphatic and blood microvessels (Vliianie leienkefalina i tirozina na limfaticheskie i krovenosnye mikrososudy).** V. K. Khugaeva, V. V. Suchkov, and M. I. Titov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, June 1982, p. 83-86. 11 refs. In Russian.

**A82-41491** † **Characteristics of night sleep disorders in the case of myocardial infarction according to polygraphic data (Kharakteristika narushenii nochnogo sna pri infarkte miokarda po dannym poligrafii).** K. Iu. Iuldashev, A. R. Rakhimdzhanov, B. G. Gafurov, and P. Saidaliev (Tashkentskii Institut Usovershenstvovaniia Vrachei, Tashkent, Uzbek SSR). *Kardiologiia*, vol. 22, June 1982, p. 90-93. 20 refs. In Russian.

**A82-41492** † **The influence of psychological and somatic factors on the symptomatics of hypertension (Vliianie psikhologicheskikh i somaticheskikh faktorov na simptomatiku gipertonicheskoi bolezni).** I. K. Shkhvatsabaia, A. P. Iurenev, and T. A. Aivazian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, June 1982, p. 98, 99. 10 refs. In Russian.

**A82-41493** † **An evaluation of the informativeness of EKG parameters in diagnosing a myocardial infarction of the back wall of the left ventricle (Otsenka informativnosti parametrov EKG pri diagnostike infarkta miokarda zadnei stenki Levogo zheludochka).** V. V. Shlygin and L. G. Aseeva (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Kardiologiia*, vol. 22, June 1982, p. 99, 100. 11 refs. In Russian.

**A82-41494** † **The use of biochemical monitoring methods in the ergometry of patients with atherosclerosis (Ispol'zovanie biokhimicheskikh metodov kontrolia pri ergometrii u bol'nykh aterosklerozom).** M. D. Mitsenko (Dnepropetrovskii Nauchno-Issledovatel'skii Institut Vosstanovleniia i Ekspertizy Trudosposobnosti Invalidov, Dnepropetrovsk, Ukrainian SSR). *Kardiologiia*, vol. 22, June 1982, p. 101, 102. 13 refs. In Russian.

**A82-41495** † **The tolerance to physical loads in women during menopause complicated by climacteric neurosis with cardialgia (Tolerantnost' k fizicheskoi nagruzke u zhenshchin, nakhodiashchikhsia v klimaktericheskom periode, oslozhnennom klimaktericheskim nevrozom s kardialgiei).** U. Sh. Ramdzhutun (Kalininskii Meditsinskii Institut, Kalinin, USSR). *Kardiologiia*, vol. 22, June 1982, p. 102-104. 8 refs. In Russian.

**A82-41496** † **A comparison of echo- and kinetocardiographic indicators of the myocardial contractility of the left ventricle in patients suffering from various forms of ischemic heart disease (Sopostavlenie ekho- i kinetokardiograficheskikh pokazatelei sokratimosti miokarda levogo zheludochka u bol'nykh s razlichnymi formani ishemicheskoi bolezni serdtsa).** N. F. Shimuk and A. I. Romanov. *Kardiologiia*, vol. 22, June 1982, p. 101-106. 10 refs. In Russian.

**A82-41497** † **Output and efficiency of the heart in young athletes as a function of the type of athletic training (Ob'em i rabotosposobnost' serdtsa u iunykh sportsmenov v zavisimosti ot napravlennosti trenirovochnogo protsessa).** V. I. Il'nitskii (Teknopol'skii Meditsinskii Institut, Teknopol, Ukrainian SSR). *Kardiologiia*, vol. 22, June 1982, p. 107-109. 9 refs. In Russian.

**A82-41498** † **The rate at which exogeneous hydrocortisone is eliminated from peripheral blood flow in patients suffering from an acute myocardial infarction (Skorost' eliminatsii ekzogennogo kortizola iz perifericheskogo krovotoka u bol'nykh ostrym infarktom miokarda).** V. N. Shershnev, A. D. Kuimov, V. A. Milaeva, V. Iu. Darianin, M. S. Nabiulin, and A. N. Pugina (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Kardiologiia*, vol. 22, June 1982, p. 109, 110. 10 refs. In Russian.

**A82-41499** † **The role of the energy transport system in changes of the contractile function of the heart in the case of the measured limitation of coronary blood flow (Rol' sistemy transporta energii v izmenenii sokratitel'noi funktsii serdtsa pri dozirovannom ogranichenii koronarnogo krovotoka).** R. A. Frol'kis, G. S. Voronkov, and N. N. Orlova (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Kardiologiia*, vol. 22, June 1982, p. 111-113. 7 refs. In Russian.

Experimental results are presented on the relationship between the characteristics of the heart's contractile function and changes of energy-transport indices in the case of measured limitation of the coronary blood flow to 70 and 90%. It is shown that changes in the makeup and activity of individual components of the energy-transport system play a considerable role in the formation of pathological and compensatory shifts in the contractile function of the damaged and conditionally intact myocardium in the early period of the partial limitation of coronary blood flow. B.J.

**A82-41500** † **Functional condition of the heart mitochondria in the dynamics of emotional and pain stress (Funktsional'noe sostoianie mitokhondrii serdtsa v dinamike emotsional'no-bolevogo stressa).** V. V. Malyshev, V. I. Lifant'ev, and V. Z. Meerson (Irkutskii Meditsinskii Institut, Irkutsk; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, June 1982, p. 113-115. 6 refs. In Russian.

Experiments were performed on male albino rats to study the effect of emotional and pain stress on heart mitochondria. It is shown that this type of stress is accompanied by considerable disruptions of the energy metabolism in the heart mitochondria, preceding the development of necrotic changes in the myocardium. These disruptions are most marked during the formation of deep contracture disorders and necrosis in the myocardium. B.J.

**A82-41501** † **The achievements of investigations carried out in the years 1976-1980 on the problem of insufficient blood circulation and heart rhythm disturbances (Itogi nauchnykh issledovanii po probleme 'nedostatochnost' krovoobrashcheniia i narusheniia ritma serdtsa' za 1976-1980 gg).** N. N. Mukharliamov and T. Iu. Shvab. *Kardiologiia*, vol. 22, June 1982, p. 120-125. In Russian.

**A82-41502** † **Problems in the metrology of the training load of ski racers (Voprosy metrologii trenirovochnoi nagruzki lyzhnika-gonshchika).** N. I. Semenov and A. G. Shiriaev (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, June 1982, p. 13-16. 11 refs. In Russian.

A special endurance coefficient (SEC) is developed as a criterion for the preparedness of ski racers. It is shown that individual indices of the magnitude and intensity of the training load are invalid as criteria for determining preparedness. A method involving the search for a maximal correlation is recommended as a mathematical procedure for the processing of data on ski-racer performance. B.J.

**A82-41503** † **Optimizing conditions for athletic activity with an allowance made for neurodynamic peculiarities /using bicycle sports as a model/ (Optimizatsiia uslovii sportivnoi deiatel'nosti s uchetom neirodinamicheskikh osobennostei sportsmenov /na modeli velosporta/).** G. G. Illarionov (Chuvashskii Gosudarstvennyi Pedagogicheskii Institut, Cheboksary, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury*, June 1982, p. 19-21. 14 refs. In Russian.

**A82-41504** † **The influence of a deficit of vitamins on immunity /A review of the literature/ (Vliianie defitsita vitaminov na immunitet /Obzor literatury/).** I. D. Surkina (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, USSR) and G. Mateev (Vysshii Institut Fizicheskoi Kul'tury, Sofia, Bulgaria). *Teoriia i Praktika Fizicheskoi Kul'tury*, June 1982, p. 22-25. 76 refs. In Russian.

**A82-41505** † **The speed of blood flow in athletes subjected to the combined action of a training regime and high-altitude climatic factors**

**(Skorost' krovotoka u sportsmenov pri sovmestnom vozdeistvii vysotno-klimaticheskikh faktorov i trenirovochnykh nagruzok).** Iu. M. Pogosian, V. G. Meloian, G. L. Muradian, A. A. Chatinian, and G. A. Akopian (Armianskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Armenian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* June 1982, p. 30, 31. 12 refs. In Russian.

**A82-41506** † **Certain psychological and tactical aspects of athlete activities during competitions (Nekotorye psikhologicheskie i takticheskie osobennosti sorevnovatel'noi deiatel'nosti sportsmena).** V. S. Keller (L'vovskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Lvov, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* June 1982, p. 47, 48. In Russian.

**A82-41548** * **Skeletal abnormalities in rats induced by simulated weightlessness.** T. J. Wronski and E. R. Morey (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). *Metabolic Bone Disease and Related Research,* vol. 4, 1982, p. 69-75. 41 refs.

A hypokinetic model has been developed which attempts to simulate the weightlessness experienced during space flight. Male rats were suspended from the model with a head-down tilt for a two-week period. Total mechanical unloading of the hind limbs and partial unloading of the fore limbs occurred. In comparison to pair-fed control rats, the skeletal alterations in the proximal tibial and humeral metaphyses of suspended rats were determined to be a diminished rate of longitudinal bone growth, a reduced mass of mineralized tissue, and an accumulation of marrow fat. Also, suspended rats exhibited decreased numbers of osteoblasts and increased numbers of osteoclasts immediately adjacent to the growth plate-metaphyseal junction at both skeletal sites. Although the reduction in mineralized tissue and the fat accumulation were more marked in the tibia, the skeletal changes in the proximal tibial and humeral metaphyses were generally comparable. The observed abnormalities may be due to mechanical unloading and/or a hypersecretion of corticosteroids. (Author)

**A82-41551** * **Telemetry methods for monitoring physiological parameters.** T. B. Fryer and H. Sandler (NASA, Ames Research Center, Moffett Field, CA). In: Hypertension research; Methods and models. New York, Marcel Dekker, Inc., 1982, p. 45-82. 73 refs.

The use of telemetry to monitor various physiological functions is discussed. The advantages of the technique and the parameters that it can monitor are assessed, and the main telemetry systems, including pressure telemetry, flow telemetry, and multichannel telemetry, are detailed. Human applications of implanted flow transducers, total implant versus backpack telemetry, the use of power sources and integrated circuits in telemetry, and the future prospects of the technique in hypertension treatment and research are discussed. C.D.

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# STAR ENTRIES

**N82-28945#** Letterman Army Inst. of Research, San Francisco, Calif.
**DOMESTIC SWINE IN PHYSIOLOGICAL RESEARCH. 3: BLOOD GAS AND ACID-BASE VALUES OF ARTERIAL AND VENOUS BLOOD FROM YOUNG ANESTHETIZED PIGS MAINTAINED UNDER STEADY-STATE VENTILATORY CONDITIONS Interim Report, Jun. - Dec. 1981**
John P. Hannon and William Y. Moores Feb. 1982 35 p refs
(DA Proj. 3M1-61102-BS-10)
(AD-A111834; LAIR-113) Avail: NTIS HC A03/MF A01 CSCL 06/16

The arterial and venous blood gas and acid-base characteristics of anesthetized, young domestic swine were determined under steady-state ventilatory conditions designed to establish arterial P O2 at 100 torr and pH at 7.40. Under these circumstances, mean (N = 15) femoral artery values were: P O2, 97 torr; S O2, 94%; C O2, 15.4 ml/dl; pH, 7.399; P CO2, 47 torr; (HCO3), 27.6 mEq/1; and (B.E.), 2.8 mEq/1. Values for pulmonary artery, mixed venous blood were: P O2, 36 torr; SaO2, 51%; C O2, 8.5 ml/dl; pH, 7.335; P CO2, 57 torr (HCO3), 29.6 mEq/1; and (B.E.), 3.9 mEq/1. Comparisons of venous values obtained from various vascular sites (pulmonary artery, anterior vena cava, posterior vena cava, internal jugular vein, femoral vein and coronary sinus) revealed numerous between-vessel differences in blood gas and acid-base status. The arterial characteristics of this anesthetized preparation differed from those of the conscious pig; the anesthetized animal had lower pH, (HCO3) and (B.E.) values and higher P O2 and P CO2 values than the conscious animal. Anesthesia with mechanical ventilation appeared to produce defects in alveolar-arterial gas exchange similar to those reported for other species. The anesthetized pig, nevertheless, can serve as an effective biomedical model for human oriented research. Author (GRA)

**N82-28946#** Letterman Army Inst. of Research, San Francisco, Calif.
**LONG-TERM AND PROGRESSIVE CHANGES IN RHESUS SPECTRAL SENSITIVITY AFTER LOW-LEVEL COHERENT LIGHT (514nm EXPOSURE) Technical Note, 1978 - 1980**
Harry Zwick, Edwin S. Bratrice, and Thomas A. Garcia Dec. 1981 17 p refs
(AD-A111639; LAIR-81-19TN) Avail: NTIS HC A02/MF A01 CSCL 06/18

Although present laser safety standards are based on an adequate data base for acute viewing situations, they are limited in predicting the type of change in visual function that might be induced from prolonged or repetitive viewing of laser sources. Viewing requirements in holography, laser display systems, and in general, repeated exposure to low levels of laser radiation require a more complete data base for optimizing the environmental protection of individuals who will be required to work in such environments. In these studies, we have simulated very low-level radiation environments and determined the effects of repetitive prolonged exposure on the visual function of the of the Rhesus. Our data suggest that prolonged viewing of such sources, even though they are well below present laser safety standards, can produce permanent changes in visual processes that underline normal human day (photopic) and night (scotopic) vision. Studies of morphology have shown possible subtle morphological correlate. The coherency of laser light is implicated as a significant factor in inducing these effects. It is recommended that individuals required to work in these situations be frequently evaluated for changes in visual function by presently available clinical instruments for assessment of visual function. Further confirmation of these studies will determine the impact of these research findings on present laser safety standards. GRA

**N82-28947#** Puerto Rico Univ., Mayaguez. Center for Energy and Environment Research.
**OTEC BIOFOULING, CORROSION, AND MATERIALS STUDY FROM A MOORED PLATFORM AT PUNTA TUNA, PUERTO RICO**
D. S. Sasscer, T. R. Tosteson, and T. O. Morgan Aug. 1981 126 p refs Prepared for ANL, Ill.
(Contract W-31-109-eng-38)
(DE82-007037; ANL/OTEC-BCM-023) Avail: NTIS HC A07/MF A01

A biofouling test of periodically cleaned, OTEC evaporator tubes was conducted. The fouling resistance, total surface carbon and nitrogen content, ATP, and the wet film thickness (WFT) were determined throughout the test. Visual observations of the fouling film were made by light sectioning and scanning microscopy, and at the end of the test, a study was made of the macrofouling of the flow system. The results of the tests indicate that a base layer of bacteria and exudated polysaccharides enhance microbial adhesion and thereby create an environment conducive to rapid film growth. Fouling rates for aluminum were generally higher than for titanium but they were linear for both materials. Excellent correlation was found to exist between R/sub f and WFT which supports the hypothesis that it is the stagnant film of water entrapped by bacteria which is largely responsible for the insulating properties of the biofilm. The macrofouling study identified 61 species of benthic invertebrates representing ten phyla growing in those parts of the flow system, where flow was less than 3 fps but no macrofouling where the flow velocity significantly exceeded 3 fps. DOE

**N82-28948#** National Inst. for Metallurgy, Randburg (South Africa).
**THE ORGANIZING OF CONFERENCES**
L. F. Haughton 18 Sep. 1981 18 p refs
(PB82-142696; NIM-2130; ISBN-0-86999-556-1) Avail: NTIS HC A02/MF A01 CSCL 05A

The Liaison and Information Division of the National Institute for Metallurgy (NIM) has been concerned in the planning and organizing of conferences, local and international, large and small, for many years, and as the result of trial and error has acquired a fair amount of knowledge of the subject and developed a successful modus operandi. It is felt that the knowledge and expertise gleaned over the years should be made available generally for use by interested organizers. GRA

**N82-28949#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT. SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 16, NO. 3, MAY - JUNE 1982**
O. G. Gazenko, ed. 2 Jul. 1982 155 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosmicheskaya Med. (USSR), 1982
(JPRS-81197) Avail: NTIS HC A08

The effects of weightlessness and acceleration on the physiology of man were studied. The heart was studied in relation to the effects of long term spaceflight, circadian rhythms, and external conditions. Different aspects of blood circulation and motion sickness were studied. For individual titles, see N82-28950 through N82-28976.

**N82-28950#** Joint Publications Research Service, Arlington, Va.
**PROBLEM OF ACCELERATIONS IN AVIATION MEDICINE**

P. V. Vasilyev and S. A. Gozulov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 2 Jul. 1982 p 1-6 (JPRS 81197) refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 4-7

Avail: NTIS HC A08

The problem of effects of accelerations on an organism, particularly on a pilot's work capacity is discussed. Further increase in the body's resistance to accelerations and, consequently, increase of pilot's work capacity are emphasized. The increasing diversity of inflight tasks and complexity of interaction in the pilot-aircraft-environment system make it imperative to examine many physiological questions from the standpoint of the systems approach and with consideration of ergonomic aspects of this problem. The accelerations inherent in aircraft flights are divided into two main types: prolonged (piloting), which occur when maneuvering the aircraft, and impact, which occur during ejection, opening of the parachute, landing of the pilot, as well as forced ('rough') landings of the aircraft. The effects of these accelerations on pilots differ appreciably. S.L.

**N82-28951#** Joint Publications Research Service, Arlington, Va.

**SLEEP, CIRCADIAN CYCLES OF PHYSIOLOGICAL FUNCTIONS AND PARAMETERS OF HUMAN WORK CAPACITY ON FIRST DAY AFTER CHANGING FROM ALTERED TO USUAL SLEEP-WAKING CYCLE**

A. N. Litsov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 7-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 8-13

Avail: NTIS HC A08

Twelve male test subjects, aged 28 to 40, took part in studies, in which a normal work-rest cycle was preceded by three types of an altered cycle, to investigate their adaptation reactions. The return to the normal work-rest cycle was accompanied by slight changes in physiological functions, work capacity and sleep patterns. The level of these changes was correlated with the type of altered work-rest cycles and with the degree of men's adaptation to them. The return to the normal work-rest cycle proceeded more readily, if adaptation to an altered cycle was incomplete. The required level of work capacity of men that have to vary their work-rest cycles frequently can be maintained by short term (for 1 to 3 days) cycle alterations. S.L.

**N82-28952#** Joint Publications Research Service, Arlington, Va.

**ROLE OF HORMONAL COMPOUNDS IN REGULATION OF ELECTROLYTE METABOLISM IN THE PRESENCE OF EMOTIONAL STRESS**

B. B. Afonin, L. L. Orlov, N. F. Kalita, T. A. Viting, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 15-19 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 13-16

Avail: NTIS HC A08

The emotional stress simulated by examinations taken by medical students led to a decrease of socium concentration in blood. A simultaneous increase of mineralocorticoids and a decrease of glucocorticoids was responsible for the sodium concentration in the blood. Both inhibition of glucocorticoids and stimulation of mineralocorticoids were associated with a high activity of plasma renin and a low concentration of adrenocorticotropic hormone. S.L.

**N82-28953#** Joint Publications Research Service, Arlington, Va.

**METABOLIC DISTINCTIONS RELATED TO INTAKE OF LOW-CALORIE 'SURVIVAL' RATIONS CONSISTING ONLY OF READILY ASSIMILATED CARBOHYDRATES**

I. G. Popov, P. A. Lozinskiy, A. A. Latskevich, and I. A. Romanova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 20-31 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 16-25

Avail: NTIS HC A08

Carbohydrate, mineral, amino acid, nitrogen metabolism, nutritional status and general health condition of test subjects were studied. In the case of an emergency landing in an area with a temperate climate, a contingency diet consisting of 300 g of readily assimilable disaccharides can be consumed for 5 days. S.L.

**N82-28954#** Joint Publications Research Service, Arlington, Va.

**DYNAMICS OF LEFT VENTRICULAR SYSTOLIC PHASE STRUCTURE DURING LONG-TERM (140-185 DAYS) SPACEFLIGHTS**

A. P. Polyakova, A. D. Yegorov, and I. V. Alferova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 32-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3,. May - Jun. 1982 p 25-30

Avail: NTIS HC A08

Kinetocardiographic studies of the left ventricular systolic time intervals at rest in spaceflights of 140, 175, and 185 days in duration revealed functional changes reflecting cardiovascular adaptation to weightlessness. The typical changes were: shortening of isometric contraction, decrease of the tension index, irregular decline of the ejection time, and a slight increase in the intrasystolic index. These changes in the systolic time intervals are indicative of an enhanced strength of cardiac contraction. This may in turn be associated with cephalad fluid shifts and reduced activity of the peripheral muscular heart. S.L.

**N82-28955#** Joint Publications Research Service, Arlington, Va.

**SLOW WAVES OF CARDIAC RHYTHM IN HEALTHY MAN UNDER DIFFERENT CONDITIONS**

A. N. Karpov and L. A. Zinovyeva *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-8197) 2 Jul. 1982 p 39-42 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 30-32

Avail: NTIS HC A08

The slow waves of the cardiac rhythm were investigated at rest and under emotional and physical stress. In most test subjects emotional stress led to the generation of the first order slow waves of 0.04-0.09 cps, whereas exercises inhibited slow waves of the above frequency range. Heart rate increased in response to both emotional and physical stress. The slow wave responses are used to evaluate the emotional status and to differentiate emotional and physical stress. S.L.

**N82-28956#** Joint Publications Research Service, Arlington, Va.

**SYNCHRONIZATION OF CARDIOVASCULAR ACCIDENTS WITH PHYSICAL CLOCKS**

R. M. Arslanova, V. N. Benevolenskiy, N. G. Ptitsyna, and K. A. Trukhanov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 43-47 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 32-34

Avail: NTIS HC A08

The frequency of cardiovascular catastrophes (daily mortality rate of patients with ischemic heart disease), heliogeomagnetic activity (solar radiation in the wave band 10.7 cm, H, D and Z components of the geomagnetic field), synchronization and desynchronization of circaseptidian rhythms, and total number of cardiovascular catastrophes in different seasons are correlated. The raw data sets were treated with due account of the discrete pattern of random sequences and noise in the medical data set, finite analysis interval and informativity of the derivatives of the parameters used. The occurrence of cardiovascular catastrophes showed circaseptidian rhythms whose level depend on the above three factors. The results obtained are discussed with respect to possible synchronization and desynchronization of endogerious biorhythms by time cues, relating them to the mechanism of human adaptation to the environment. S.L.

**N82-28957#** Joint Publications Research Service, Arlington, Va.

**REGULATION OF CEREBRAL CIRCULATION IN ERECT POSITION**

V. S. Shubin, V. L. Anzimirov, Ya. K. Gasanov, and V. N. Korniyenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 48-55 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 35-40

Avail: NTIS HC A08

The functional mechanisms responsible for orthostatic tolerance of cerebral circulation in the normal man and in ambulatory and bedridden neurosurgical patients were investigated, using the following methods: cerebral serial angiography, measurement of cerebral blood flow by means of xenon 133 clearance, measurement of brain perfusion pressure, ventricular pressure, acid base equilibrium in the blood flowing in and out of the brain, determination of cardiac output and stroke volume, electroencephaloraphy, and rheography of cerebral and peripheral vessels. In the normal men and patients with compensated neurosurgical pathologies, the transfer into the head up position induced small changes in the systemic and cerebral regional circulation. This was associated with complex reactions of the vascular system triggered by the receptors of the sinocarotid area. S.L.

**N82-28958#** Joint Publications Research Service, Arlington, Va.

### ENDURANCE OF +Gz G FORCES BY MIDDLE-AGED PEOPLE BEFORE AND AFTER 7-DAY IMMERSION

A. R. Kotovskaya, I. F. VilVilyams, V. I. Zborovskaya, V. G. Andreyeva, O. L. Golovkina, T. N. Krupina, Kh. Kh. Yarullin, and N. P. Artamonova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 56-60 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 40-43

Avail: NTIS HC A08

Before and after 7 day immersion G sub z for 60 sec in a centrifuge with an arm of 7.25 m. The runs were repeated 12 times. The test subjects tolerated the exposure before and after immersion. However, after immersion the physiological systems functioned in a more stressful manner than prior to immersion. This is attributed to the deconditioning caused by simulated weightlessness. The comparison of the experimental findings with the literature data gives evidence that the pattern and level of physiological changes induced by an exposure to +3 G sub z for 60 sec in the test subjects, aged 41 to 43, do not differ significantly from those in younger (aged 23 to 36) people. S.L.

**N82-28959#** Joint Publications Research Service, Arlington, Va.

### HUMAN EXTERNAL RESPIRATION AND GAS EXCHANGE IN ACUTE PERIOD OF ADAPTATION TO IMMERSION IN WATER

O. L. Golovkina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1082 (JPRS 81197) 2 Jul. 1982 p 61-65 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 43-46

Avail: NTIS HC A08

Responses of respiration and gas exchange of 6 test subjects to 3-day dry immersion were investigated. It was found that an exposure to immersion was accompanied by decreases in respiratory volume, vital lung capacity, maximum pulmonary ventilation, and breathing time retention during inhalation and expiration. These changes were paralleled by an increase in the portion of the functional dead space and a decrease in the portion of the efficient alveolar volume. The permeability of respiratory tracts remained unchanged. These changes seem to be of the type of total respiratory insufficiency induced by circulatory disorders. This may be one of the factors responsible for a decline in human tolerance to exercises and acceleration applied after an exposure to simulated weightlessness. Author

**N82-28960#** Joint Publications Research Service, Arlington, Va.

### REACTION TO DIMINISHED CIRCULATING BLOOD VOLUME IN INDIVIDUALS WHO ARE SUSCEPTIBLE AND INSUSCEPTIBLE TO MOTION SICKNESS (SEASICKNESS)

V. G. Isupov, D. G. Maksimov, and B. I. Polyakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 66-70 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 46-49

Avail: NTIS HC A08

The study of 54 healthy male test subjects demonstrated significantly different responses of motion sickness susceptible and resistant people to 10 minute occlusion of their femoral veins. The changes in limb rheograms, as well as heart rate and stroke volume indicated that in motion sickness susceptible subjects the circulating blood volume in the upper body decreased, whereas in motion sickness resistant subjects it remained unaltered or increased in response to the occlusion. Author

**N82-28961#** Joint Publications Research Service, Arlington, Va.

### EFFICACY OF KAVINTON IN PREVENTION OF MOTION SICKNESS

D. Bodo, A. R. Kotovskaya, R. R. Galle, L. N. Gavrilova, G. A. Gusakova, and V. A. Smirnov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 71-74 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 49-51

Avail: NTIS HC A08

During the study 8 motion sickness susceptible test subjects were kept in a chamber rotating at a rate of 6 rpm for 5 hours. The effectiveness of the drug taken regularly during the exposure was compared with that of scopolamine and placebo taken as a single dose. The results obtained are suggestive of a positive effect of kavinton as an antimotion drug. T.M.

**N82-28962#** Joint Publications Research Service, Arlington, Va.

### NYSTAGMOMETRY OF OPTOVESTIBULAR INTERACTION

M. M. Levashov and A. I. Tumakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 75-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 51-55

Avail: NTIS HC A08

Nystagmograms recorded in healthy people (270 ENG from 30 children, aged 3 to 7) were analyzed quantitatively. The velocity of the slow component of the vestibular nystagmus during caloric tests, optokinetic nystagmus in response to stimul applied at 20 and 10 deg/sec, as well as vestibulooptokinetic nystagmus resulting from modulation of he optokinetic nydtagmus due to the inhibitory or enhancing effect of caloric stimulation, were measured. The modulation level, i.e., the change of the velocity of the slow component that accompanied the transition of the optokinetic nystagmus to the vestibulo-optokinetic nystagmus, was always less than that of the vestibular nystagmus. This disagrees with the concept about algebraic summation of intensities of the reactions. The modulation level showed a low correlation with the vestibular nystagmus slow component velocity and depended on the optokinetic nystagmus velocity. Author

**N82-28963#** Joint Publications Research Service, Arlington, Va.

### EFFECT OF CALORIC STIMULATION OF VESTIBULAR SYSTEM ON HEARING

G. P. Tsurikova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 81-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 55-58

Avail: NTIS HC A08

Changes of bone-conduction thresholds for tonal signals (250 and 2000 Hz) in each ear due to caloric vestibular tests were studied in 60 healthy test subjects (32 men and 28 women). These changes were found in 48 subjects. In most cases perceptual thresholds decreased (by 7.3 dB on the average) and in few cases increased (by 8.3 dB on the average). The sign of alteration was independent of the tonal signal frequency or the side exposed to the vestibular test or the number of examinations. The threshold returned to the norm for a long time (30 min or more). These findings suggest that the interaction may be governed by the principles that function in other sensory systems. It is recommended to carry out audiological examinations prior to vestibular tests in order to avoid distortions of the results. Author

**N82-28964#** Joint Publications Research Service, Arlington, Va.

### POSSIBLE IMPAIRMENT OF RESPIRATORY REGULATION UNDER HYPERBARIC NITROGEN NARCOSIS

L. A. Bryantseva, A. V. Suvorov, and I. S. Breslav *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 87-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 59-61

Avail: NTIS HC A08

Nitrogen narcosis was simulated by nitrous oxide. The ventilation increment was measured as a function of an increase of the hypercapnic stimulus. A combination of high degree of hypercapnia and the narcotic effect may lead to ventilation inhibition and respiration disturbance. T.M.

**N82-28965#** Joint Publications Research Service, Arlington, Va.

### MITOTIC ACTIVITY AND VOLUME OF EPITHELIAL CELL NUCLEI OF RAT CORNEA FOLLOWING SPACEFLIGHTS IN BIOSATELLITES

F. V. Sushkov, S. V. Rudneva, N. G. Sepetova, and Z. Ye. Vnukova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 91-98 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 61-66

Avail: NTIS HC A08

The following parameters of the epithelial mitosis were studied: mitotic index, ratio of mitotic phases, number of abnormalities of cell division, and number of chromosome aberrations in anaphases. These parameters are considered to be indicators of physiological regeneration. The nuclear volume of cells of two inner epithelial layers was measured, using a modified karyometric technique that yielded representative data. The lack of significant changes in the above mitotic parameters can be attributed either to the absence of a strong stress-reaction of rats postflight or to the discrepancy between the time of animal sacrifice and the time of the maximum post-stressor inhibition of mitotic activity. T.M.

**N82-28966#** Joint Publications Research Service, Arlington, Va.

### CATECHOLAMINES AND ENZYMES OF THEIR METABOLISM IN RAT MYOCARDIUM AFTER FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

R. Kwetnianski, R. A. Tigranyan, and T. Torda *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3 May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 99-102 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 66-68

Avail NTIS HC A08

In the myocardium of the weightless and contrifuged rats flown for 18.5 days onboard the biosatellite Cosmos-936 the catecholamine concentration and activity of enzymes involved in their synthesis and degradation, dopamine-beta-hydroxylase, monoamine oxidase and catechol-O-methyl transferase, were measured. The catecholamine concentration in the myocardium of both flight groups significantly increased, and the enzyme activity did not change. These results suggest that an exposure to space flight increases the catecholamine concentration and exerts no effect on their synthesis and degradation in the rat myocardium. Author

**N82-28967#** Joint Publications Research Service, Arlington, Va.

### NITROGEN COMPOUND LEVELS IN TISSUES OF RAT CEREBRAL HEMISPHERES AND CEREBELLUM AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE

L. M. Kurkina and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 103-106 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 68-70

Avail: NTIS HC A08

The content of ammonia, glutamine, urea, glutamic acid, aspartic acid, and GABA was measured to study nitrogen metabolism. Soon after recovery (6-10 hours after recovery) the content of the above compounds in brain tissues increased, except for GABA whose content decreased. Similar but more marked changes were seen in the brain of control rats exposed to a repeated immobilization stress-effect. These changes were still greater in the flight rats exposed to a repeated immobilization stress-effect postflight. It is suggested that the postflight changes of the above parameters of nitrogen metabolism are induced by stress-agents inherent in space flight and recovery. Author

**N82-28969#** Joint Publications Research Service, Arlington, Va.

### CONDITION OF RATS CONNECTIVE TISSUE DURING LONG-TERM HYPOKINESIA AND IN RECOVERY PERIOD

P. P. Potapov *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 112-116 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 73-76

Avail: NTIS HC A08

Changes in the content of collagen in hydroxyproline, total aminopolysaccharides hexosamines, and acid glycosaminoglycans in hexuronic acids in the skin and tendons of white rats were determined on the 15, 30 and 19th hypolinetic days and on the 15, 30 and 90th days of posthypokinesia recovery. It was found that the hydroxyproline content in the skin and tendons did not change, the content of hexosamines and hexuronic acid decreased in tendons on hypokinetic days 15 and 90 and in the skin on day 15. The content of hexosamines in the skin increased on day 90, the content of hexosamines and hexuronic acids in the skin and tendons increased on recovery day 15 and remained unaltered on day 90. E.A.K.

**N82-28970#** Joint Publications Research Service, Arlington, Va.

### OSTEOPOROSIS IN UNSUPPORTED EXTREMITIES

A. I. Volozhin, G. P. Stupakov, A. N. Polyakov, S. M. Remizov, N. N. Pavlova, and I. Ye. Didenko *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 117-125 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 76-82

Avail: NTIS HC A08

Dystrophic changes in bone tissue, classified as osteoporosis, were demonstrated under the influence of spaceflight factors and model experiments where the bearing function of bones was eliminated. The lower part of the right extremities was amputated in dogs thus generating a support free state of the femur. On day 90 after the amputation bone resorption reached a high level and by the end of the year declined. The mature bone microstructures showed a higher degree of mineralization, whereas the young bone microstructures which were in predominance in the support free femur displayed a lower degree of mineralization. In bone, the content of Ca decreased, that of K increased, while the content of Na and P remained unchanged. It is concluded that the development of osteoporosis in the support free femur does not involve only quantitative variations in the mineral components. E.A.K.

**N82-28971#** Joint Publications Research Service, Arlington, Va.

### PREPARATION OF LABYRINTHECTOMIED ANIMALS FOR FLIGHT ABOARD COSMOS-936 BIOSATELLITE

A. R. Kotovskaya, Ye. A. Savina, A. V. Mokrousova, Ye. I. Alekseuev, A. S. Markin, V. F. Anichin, A. A. Shipov, and G. S. Ayzikov *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 126-131 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 83-86

Avail: NTIS HC A08

Labyrinthectomized animals (LA) were tested aboard the Cosmos 936 biosatellite. It was assumed that examination of LA after the space flight would make it possible to assess the role of the vestibular system in the complex reactions to long term weightlessness. It is found that LA endure weightlessness more calmly and easily than anticipated. Preparation of LA for the space flight included problems like refining of the technique and performing effective labyrinthectomy on animals, monitor their condition in the postoperative period. E.A.K.

**N82-28972#** Joint Publications Research Service, Arlington, Va.

### METHODOLOGICAL ASPECTS OF TESTING ERYTHROCYTE BALANCE BY COUNTING INCUBATED RETICULOCYTES

A. V. Llykhin, T. Ye. Burkovskaya, A. V. Shafirkin, and N. V. Klyuchanskaya *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 132-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 86-88

Avail: NTIS HC A08

The mechanisms, causing erythrocyte deficiency are discussed. The correlations between cytokinetic parameters of erythrocyte balance was investigated to assess functional activity.

reserve potential and mechanisms of development of various disturbances in the erythron system. Quantitative evaluation of erythrocyte balance are made by cytokinetic methods for examining erythropoiesis and dieresis. Techniques involving intravital labeling of erythrocytes with radioactive isotopes are reliable but not indifferent to the body. It is found that determination of erythrocyte life span by in vitro maturation rate of reticulocytes is least disturbing to the patient and suitable for space research purposes. E.A.K.

**N82-28973#** Joint Publications Research Service, Arlington, Va.

**MODIFICATION OF METHOD FOR ASSAYING OZONE BY THE DIACETYL DIHYDROLUTIDINE REACTION**

B. V. Anisimov, G. N. Kuzmenko, and T. I. Golubeva *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS 81197) 2 Jul. 1982 p 137-139 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 89-90

Avail: NTIS HC A08

Ozone as the main toxic component of the atmosphere in photochemical smog and as a necessary factor for trace concentration to assure a biological quality of the atmosphere of areas with people in need of natural air ventilation was studied. Methods for measuring ozone in pressurized areas are discussed. E.A.K.

**N82-28974#** Joint Publications Research Service, Arlington, Va.

**EFFECTS OF LOW-INTENSITY ELECTROMAGNETIC FIELDS ON HUMAN AND ANIMAL ERYTHROCYTES**

V. P. Shabayev *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 140-142 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 91-92

Avail: NTIS HC A08

The balancing of Locke-Ringer solution and human and albino rat blood erythrocyte suspensions (50% hematocrit) prepared with this solution was studied. Changes in oxygen concentration and pH served as parameters characterizing the state of the aqueous medium. Permeability of erythrocyte membranes to water according to hemolysis was assessed. A tent which outer wall was made of ferromagnetic material, served as a shield to attenuate the electromagnetic field of Earth. Specimens were exposed for 3 hours in the ungrounded shield and ordinary conditions. The effect of the shield was assessed. The aqueous Locke-Ringer solutions stored under electromagnetic shields contain 8% more oxygen than control. It is found that with the use of the shield there is a large amount of hemoglobin and two other proteins in the intercellular region which are in the space near the cathode in electrophoresis. E.A.K.

**N82-28975#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF HIGH AMBIENT TEMPERATURE ON CARBOHYDRATE METABOLISM IN RAT LIVER AND SKELETAL MUSCLES**

R. Akhmedov and A. M. Nasyrova *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 143-146 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 92-94

Avail: NTIS HC A08

Brief and prolonged exposure to high and low ambient temperatures which leads to substantial changes in physiological reactions that maintain temperature homeostasis in organisms was studied. Adaptive changes in physiological functions are based on adaptive shifts in intensity of metabolism and energy. Organic, tissular and cellular mechanisms of change in metabolism, the significant of the different elements of metabolism in different physiological systems of the body involved in maintaining temperature homeostasis with a changing ambient temperature are investigated. Changes in carbohydrate metabolism in the liver and skeletal muscles related to exposure to high ambient temperatures, are demonstrated. E.A.K.

**N82-28976#** Joint Publications Research Service, Arlington, Va.

**VIBRATION AND ASSESSMENT OF THIS FLIGHT FACTOR BY PILOTS**

Yu. N. Kamenskiy *In its* USSR Rept: Space Biol. and Aerospace Med., V. 16, No. 3, May - Jun. 1982 (JPRS-81197) 2 Jul. 1982 p 147-151 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (USSR), v. 16, no. 3, May - Jun. 1982 p 94-96

Avail: NTIS HC A08

Vibration on active factors in the pilot-helicoper encironment system is discussed. The effect of this factor on pilot performance and its source of information on the status of the helicoper and its systems is emphasized. The role of noninstrument information (angular and longitudinal accelerations, vibration, noise) in piloting an aircraft (higher precision of control, recognition of emergency situations) is confirmed. Special purpose pilot training in the use of such negative flight factors as vibration, buffeting as information about the status of the vehicle to be controlled is recommended standardized and their practical use are considered. E.A.K.

**N82-28977#** Joint Publications Research Service, Arlington, Va.

**USSR REPORT. LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 16**

12 May 1982 87 p refs Transl. into ENGLISH of various Russian articles

(JPRS-80789) Copyright. Avail: NTIS HC A05

The use of microorganisms to monitor environmental pollution, the biochemistry of peptide and protein bioregulators, insect breeding, rat behavior, a microelectronic electrode brain probe, and the environmental and genetic aspects of human intellectual capacities are discussed.

**N82-28978#** Joint Publications Research Service, Arlington, Va.

**MICROORGANISMS USED TO MONITOR ENVIRONMENTAL POLLUTION**

G. A. Bagdasaryan and K. V. Geniatulin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 16 (JPRS-80789) 12 May 1982 p 1-4 refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 11, Nov. 1981 p 11-13

Copyright. Avail: NTIS HC A05

The use of microorganisms to measure environmental pollution is discussed. Criteria for the selection of specific microorganisms depend on metabolic and genetic changes of the microorganism under the influence of pollution. Development of standardization and metrology of measurements with the required reproducibility and accuracy is considered. Mathematical methods for choosing test systems for microorganisms and their parameters for demonstration of pollutants and processing measurement results are discussed. J.D.

**N82-28979#** Joint Publications Research Service, Arlington, Va.

**MONOGRAPH ON NEW DIRECTION OF CHEMISTRY AND BIOLOGY OF PEPTIDE AND PROTEIN BIOREGULATORS REVIEWED**

V. Ivanov and A. Miroshnikov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 16 (JPRS-80789) 12 May 1982 p 13-15 Transl. into ENGLISH from Izv. Akad. Nauk Latvivskoy SSSR (USSR), no. 1, Jan. 1982 p 137-138

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The development of methodological and experimental approaches to the study of the mechanisms of action of low molecular peptide hormones and kinins is described. Principles of information theory were applied to studies of complex stochastic systems, and the modeling method was used with extrapolation of results from one complex system to another. The principles that determine ligand-receptor interaction in the formation of complexes of trypsin group enzymes with certain protease inhibitors are analyzed. Common, universal principles which determine peptide-protein and protein-protein interaction are outlined. The selective design and laboratory synthesis of cyclic analogs of hormones and other peptide-protein bioregulators which are more selective and have longer action than their natural prototypes are described. J.D.

**N82-28980#** Joint Publications Research Service, Arlington, Va.

**CULTIVATION OF INSECTS AS NEW BRANCH OF ENTOMOLOGY - INDUSTRIAL ENTOMOLOGY**
N. A. Tamarina *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 16 (JPRS-80789) 12 May 1982 p 16-26 refs Transl. into ENGLISH from Zool. Zh. (USSR), v. 60, no. 11, Nov. 1981 p 1605-1613
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The general principles and methods of cultivating insects are formulated as a new branch of applied entomology (technical entomology) whose methodology is the systems approach and optimization theory based on modern computer technology. Cultivation of insects is viewed as the development of artificial populations with specified properties. The process of creating cultures is divided into three periods: (1) the introduction of species into the laboratory; (2) the development and standardization of cultures of different types; and (3) the creation of mass scale cultures with specified properties. The tasks and methods of each period are discussed. A new classification is offered for insect cultures. J.D.

**N82-28981#** Joint Publications Research Service, Arlington, Va.
**ORIENTING AND EXPLORATORY BEHAVIOR OF GRAY RAT IN OPEN FIELD. ZOOPSYCHOLOGICAL ANALYSIS**
N. N. Meshkova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 16 (JPRS-80789) 12 May 1982 p 32-41 refs Transl. into ENGLISH from Byull. Mosk. Obshch. Ispyt. Prir., Otd. Biol. (USSR), v. 86, no. 6, Nov. - Dec. 1981 p 22-29
Copyright. Avail: NTIS HC A05

The orienting and exploratory behavior of gray rats in an open field environment was observed to contain the following behavior elements: spatial orienting stances, movement, inspection of objects, and actions referable to the category of shifted activity. Each of these elements is readily distinguished in the continuum of behavior and serves a specific role in the familiarization of animals with a new terrain. The process of becoming familiar with an open field is broken down into four stages characterizing different degrees of conformity of rate behavior to the distinctions of the terrain. The animal begins to orient itself with regard to the properties of the field on the basis of its individual experience at the start of the first stage, and a complete image of the surroundings is formed at the fourth stage of exploration. J.D.

**N82-28982#** Joint Publications Research Service, Arlington, Va.
**MICROELECTRONIC ELECTRODE PROBE FOR TESTING BRAIN ELECTRICAL ACTIVITY**
B. V. Zhuravlev and A. B. Simakov *In its* USSR Rept.: Life Sci. Biomed. and Behavior Sci., No. 16 (JPRS-80789) 12 May 1982 p 50-52 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (USSR), v. 24, no. 12, Dec. 1981 p 66-68
Copyright. Avail: NTIS HC A05

The development and construction of a multichannel electrode probe combining both the micropipette and metal electrodes is described. The size of he active electrode surfaces is 50x50 microns and that of the contact areas is 250x250 microns. Gold is used as the material for the active electrode area. The electrical properties of the probe are described and its main electrical parameters given. The experimental introduction of the probe into the hypothalamus of a rabbit is described. J.D.

**N82-28983#** Joint Publications Research Service, Arlington, Va.
**NATURAL AND SOCIAL DETERMINATION OF HUMAN PSYCHE**
G. I. Tsaregorodtsev and N. I. Gubanov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 16 (JPRS-80789) 12 May 1982 p 72-82 refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 4, Apr. 1981 p 56-65

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The role of biological and social factors in the inception and development of human consciousness and thinking are discussed in the light of Marxist philosophy. The development of opinions on the relative weight which is given to genetic and social factors in the development of intelligence is focussed upon. It is concluded that intelligence is determined by social factors acting upon inherited mental capacity. J.D.

**N82-28986*#** Maryland Univ., Baltimore. Dept. of Neurology.
**TESTOSTERONE ENHANCES [C-14] 2-DEOXYGLUCOSE UPTAKE BY STRIATED MUSCLE**
James Toop and Stephen R. Max [1982] 22 p refs
(Grants NAG2-100; NS-15766)
(NASA-CR-169101; NAS 1.26:169101) Avail: NTIS HC A02/MF A01 CSCL 06P

The effect of testosterone propionate (TP) on C-14 2-deoxyglucose (C-14 2DG) uptake was studied in the rat levator ani muscle in vivo using the autoradiographic technique. Following a delay of 1 to 3 h after injecting TP, the rate of C-14 2DG uptake in experimental animals began to increase and continued to increase for at least 20 h. The label, which corresponds to C-14 2-deoxyglucose 6-phosphate, as demonstrated by chromatographic analysis of muscle extracts, was uniformly distributed over the entire muscle and was predominantly in muscle fibers, although nonmuscular elements were also labeled. The 1 to 3 h time lag suggests that the TP effect may be genomic, acting via androgen receptors, rather than directly on muscle membranes. Acceleration of glucose uptake may be an important early event in the anabolic response of the rat levator ani muscle to androgens. S.L.

**N82-28987#** Naval Aerospace Medical Inst., Pensacola, Fla.
**A PROCEDURE FOR THE ANALYSIS OF NYSTAGMUS AND OTHER EYE MOVEMENTS**
Graham R. Barnes 23 Jun. 1981 21 p refs Prepared in cooperation with the Royal Air Force Inst. of Aviation Medicine
(M0933PN004; MR0410103)
(AD-A112603; NAMRL-1280) Avail: NTIS HC A02/MF A01 CSCL 06/16

A new procedure was developed to analyze oculomotor responses to many forms of vestibular and/or visual stimuli used in experimental work and in clinical practice. The main advantage of the procedure lies in the simplicity of the basic algorithm which enables fairly rapid data analysis of a variety of response forms on a medium-speed computer working in a high-level language. For slow phase analysis, detection of saccades is carried out by a simple threshold procedure based upon the expected response form, and regression procedures are used to obtain stimulus-response correlation and slope (gain) measures. The procedure provides measures of gain, phase, and directional preponderance for responses to sinusoidal stimuli. Author (GRA)

**N82-28988#** Canyon Research Group, Inc., Westlake Village, Calif.
**VISUAL TECHNOLOGY RESEARCH SIMULATOR (VTRS) HUMAN PERFORMANCE RESEARCH: PHASE 3 Final Report, 1 May 1980 - 30 Nov. 1981**
G. Lintern, B. E. Nelson, D. J. Sheppard, D. P. Westra, and R. S. Kennedy Nov. 1981 45 p refs
(Contract N61339-78-C-0060)
(AD-A112475; TR-81-022; NAVTRAEQUIPC-78-C-0060-11)
Avail: NTIS HC A03/MF A01 CSCL 05/9

This report summarizes the research projects for which Canyon Research Group, Inc. has a major responsibility under the Visual Technology Research Simulator (VTRS) Human Performance Research Contract. The basic research approach has been multifactor and much of the experimental preparations involved demonstration of the feasibility of efficient multifactor designs. Multifactor performance and transfer studies have been completed. Other work has involved the investigation of unconventional visual displays for flight training, automatic freeze techniques for carrier landing instruction, and descent rate cuing as an aid to glideslope tracking for carrier landings. Work has also continued on the development of performance measurement and statistical analysis capabilities. Common emphases of the experimental program were that disparate and generally costly equipment features were studied experimentally in pilots making carrier landings. The general findings were that: practice effects were small; main effects of equipment features modest; some display principles improve performance; and individual differences were reliable and large. The importance of fidelity for other purposes (e.g., pilot acceptance, realism) is problematic. GRA

**N82-28989#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
**SIMULATION OF THE MOTION OF THE CENTER OF MASS OF AN OCCUPANT UNDER EJECTION ACCELERATIONS Final Report**

Louis A. DAuderio and George D. Frisch (Naval Biodynamics Lab., New Orleans) Sep. 1981 46 p refs
(WF4140000)
(AD-A113806; NADC-81305-60) Avail: NTIS
HC A03/MF A01 CSCL 06/19

The development of highly sophisticated and complex ejection seats to provide safe egress from aircraft during low altitude, high speed and adverse attitude ejections addresses the need for a reliable computer simulation capability to determine the trajectory of the seat and occupant under these conditions. The occupant response to increasingly severe acceleration profiles must, therefore, be addressed if the simulation model is to be able to evaluate the behavior of the seat/occupant system. Traditionally, the seat and occupant have been treated in combination as a rigid body for purposes of trajectory analysis. However, experience with ejection seat tests has demonstrated a considerable amount of relative motion between the occupant (typically an anthropomorphic dummy) and the seat itself. This report presents a lumped mass, spring-damper mathematical computer model to simulate the motion of the occupant's C.G. with respect to the seat under a dynamic ejection environment. The analysis of anthropomorphic dummy results and of computer generated biodynamic simulation data used in the evaluation of the model will be discussed. Author (GRA)

**N82-28990#** Lovelace Biomedical and Environmental Research Inst., Albuquerque, N. Mex.

### THE BIOLOGICAL EFFECTS OF REPEATED BLASTS Final Report, 30 Apr. 1980 - 30 Apr. 1981

Donald R. Richmond, John T. Yelverton, and E. Royce Fletcher 30 Apr. 1981 42 p refs
(Contract DNA IACRO 81-832; DNA Proj. U99-QAXMK000)
(AD-A113113; AD-E300951) Avail: NTIS HC A03/MF A01 CSCL 06/21

The results of investigations on the biological effects of repeated blasts were reviewed. Sheep and swine were subjected to mulitple blasts at a rate of one per minute in 100-percent mortality in 1 hour. Blast injuries to the organs in the neck (larynx, pharynx, and trachea) and the gastrointestinal tract occurred at blast overpressure levels lower than those necessary for lung hemorrhage for both single and multiple exposures. Curves estimating the LD1 for man as a function of incident overpressure and number of blasts were compiled. For a standing man the LD1 incident overpressure was 27 psi (186 KPa) for a single blast and 18 psi (124 kPa) for five blasts. The overpressures from one or five blasts required to inflict selected injuries in man were presented. Author

**N82-28991#** Arkansas Univ., Little Rock.

### PHYSIOLOGICAL STUDIES OF HEAT STRESS ACCLIMATION DURING A SPECIFIC EXERCISE REGIMEN Final Report

Leland F. Morgans 20 Oct. 1981 7 p Submitted for publication
(Grant AF-AFOSR-0098-81; AF Proj. 2312)
(AD-A111897; AFOSR-82-0091TR) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Eleven subjects were used to determine the effects of racquetball on core temperature, skin temperature, sweat production, and weight loss. The results indicated that an hour of racquetball play produced a significant increase in core temperature, a significant decrease in skin temperature, a high level of sweating and a weight loss. It was concluded that the exercise regimen of racquetball can act as a good heat stress acclimator by virtue of finding that it produced a significantly high level of hyperthermia. Author (GRA)

**N82-28992#** Naval Aerospace Medical Research Lab., Pensacola, Fla.

### DETERMINING VISUAL ACUITY THRESHOLDS: A SIMULATION STUDY OF STIMULUS PRESENTATION STRATEGIES

David J. Blower Aug. 1981 24 p refs
(ZF51524004)
(AD-A111821; NAMRL-1282) Avail: NTIS HC A02/MF A01 CSCL 05/10

An accurate and economical method for determining visual acuity thresholds was necessary for many tests in the Vision Test Battery (VTB). There were certain unanswered questions as to how the classical up and down method of presenting stimuli would perform in this regard with a four alternative forced choice task. To answer these questions computer simulation runs of the up and down method were carried out. A model of the psychometric function relating probability of correct detection to stimulus gap size was based on the cumulative normal distribution. The parameters of this model were chosen to characterize one of the acuity tests in the VTB. The intent of the simulation with this model was to generate a large sample of acuity thresholds, and, from this sample, form an estimate of the average acuity threshold and its variability for any given number of trials. An alternative method of presenting stimuli in a sequential manner was also studied via simulation. This method, called the bracket method, proved to be superior to the up and down method in calculating an average estimate of threshold acuity. The error attached to the threshold acuity estimate was also smaller in the bracket method. When the slope of the psychometric curve was varied over a large range, the bracket method retained these advantages over the up and down method. Author (GRA)

**N82-28993#** Army Research Inst. of Environmental Medicine, Natick, Mass.

### ACCLIMATIZATION TO DRY HEAT: ACTIVE MEN VERSUS ACTIVE WOMEN

Donald H. Horstman and Elaine Christensen 29 Jan. 1982 29 p refs
(DA Proj. 3E1-61102-BS-10)
(AD-A111708; USARIEM-M-13/82) Avail: NTIS
HC A03/MF A01 CSCL 06/19

The purposes of this study were to compare performance of exercise of equal relative intensity in dry heat and related physiological responses between active men and active women of nearly equal physical fitness level before, during and after heat acclimatization. GRA

**N82-28994#** Air Force Hospital, Wiesbaden (West Germany). Bioenvironmental Engineering Services Dept.

### AN INDUSTRIAL HYGIENE EVALUATION OF AIRCRAFT REFUELING INSIDE CLOSED AIRCRAFT SHELTERS AT ELEVATED AMBIENT TEMPERATURES Final Report, Aug. - Sep. 1981

Joseph A. Martone Oct. 1981 26 p refs
(AD-A114396; BEES(W)-81-42) Avail: NTIS
HC A03/MF A01 CSCL 01/3

This report presents results of three in-shelter aircraft refueling tests with ambient temperatures of 30 C or higher. For the specific situations studied, refuel crew personnel were exposed to total fuel vapor concentrations approaching permissible exposure limits. Exposure to benzene and other selected fuel vapor components were well below permissible exposure limits. The data were normalized to predict that personnel exposures above 50 percent of the short term exposure limit for fuel vapors would occur in both first and modified first generation shelters at elevated temperatures. The data support temperature limitations for in-shelter refueling with JP-4 in first and modified first generation shelters. No such limitations were found necessary for second or third generation shelters as they provide nearly three times the dilution volume of first generation shelters. To permit in-shelter refueling above the recommended temperature limits, restrictions on the amount of fuel transferred are suggested. Special consideration is given to the F-111 aircraft because of its large fuel capacity. GRA

**N82-28995#** Oak Ridge National Lab., Tenn.

### WHAT IS ALARA

J. A. Auxier 1981 12 p refs Presented at Edison Elec. Inst. Health Phys. Comm. Meeting, Hartford, 10 Sep. 1981
(DE81-030814; CONF-810968-1) Avail: NTIS
HC A02/MF A01

The history of ALARA and what it seemingly means to different interest groups is discussed. A balanced viewpoint that health physicists should adopt is presented. The as-low-as-reasonably-achievable (ALARA) philosophy as it applies to personnel radiation exposure is outlined. The essential tenets of this philosophy surfaced early in the history of the Manhattan Project. Although the terminology has suffered through various translations, the principles remain valid. Some regulatory agencies claim ALARA as their newfound miracle drug and that application according to their prescriptions will result in endless rounds of cyclical improvement in radiation protection practices. Advantage is taken of the popularity of ALARA and the philosophy is standardized to mean whatever is expedient for their purposes.

**N82-28996#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
**THE CONSEQUENCES OF HYDRAZINE EXPOSITION AND ITS TREATMENT**
E. Mester Jun. 1981 11 p refs In DUTCH; ENGLISH summary
(Contract A76/K/098)
(MBL-1981-2; TDCK-75105) Avail: NTIS HC A02/MF A01

The consequences for man and animals of exposure to hydrazine in the event of a crash of an F-16 aircraft whose emergency power unit contains hydrazine are described. Hydrazine and its derivatives are corrosive to eyes, mucous membranes and skin, and are harmful to many organs. The measures to be taken in case of an accident are outlined. Author (ESA)

**N82-28997#** Pennsylvania State Univ., University Park. Dept. of Psychology.
**ADAPATIVE MOTIVATION THEORY Annual Report, 15 Dec. 1979 - 1 Feb. 1981**
Frank J. Landy Feb. 1982 60 p refs
(Contract N00014-81-K-0197; NR Proj. 170-906)
(AD-A111195; Rept-82-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

This report presents the theoretical foundation for a new set of propositions regarding human motivation called Adaptive Motivation Theory. The major proposition of the theory is that individuals undergo cognitive change as a result of environmental interaction. This cognitive change has implications for motivated behavior. In addition to a statement of the theory, activities for the past year and the next year are discussed. Author (GRA)

**N82-28998#** Navy Personnel Research and Development Center, San Diego, Calif.
**ON MODELS AND METHODS FOR PERFORMANCE MEASUREMENT Final Report, Aug. 1979 - Sep. 1980**
William J. Moonan Mar. 1982 22 p refs
(AD-A113578; NPRDC-TN-82-11; NPRDC-11-80-12) Avail: NTIS HC A02/MF A01 CSCL 05/9

Models were specified and methods defined that characterize performance measurement as a process and as a function of (1) the performer's capability, (2) variables that indicate how well job operations are performed, and (3) the difficulties of those operations. The report shows methods of mathematical measurement model development that relate (1), (2), and (3) above. A performance quality model was defined. Illustrations of two performance models were provided through examples. Author (GRA)

**N82-28999#** Canyon Research Group, Inc., Westlake Village, Calif.
**UNCONVENTIONAL VISUAL DISPLAYS FOR FLIGHT TRAINING Interim Technical Report, 1 May 1980 - 30 Nov. 1981**
Robert T. Hennessy (NAS-NRC), Gavan Lintern, and Stanley C. Collyer (Naval Training Equipment Center) Orlando, Fla. Naval Training Equipment Center Nov. 1981 66 p refs
(Contract N61339-78-C-014)
(AD-A111392; TR-81-014; NAVTRAEQUIPC-TR-81-014) Avail: NTIS HC A04/MF A01 CSCL 05/9

Use of simulators for flight instruction has typically followed the pattern of using similar instructional approaches to those that have traditionally been used for in-flight instruction. However, there is a growing awareness that a simulator permits radical departures from the traditional methods. Some of these may be less expensive or even more effective in terms of acquiring the skill. The general purpose of the research reported here was to examine training effectiveness for basic flight tasks of radically different methods of displaying the information that is necessary to support learning of the tasks. Four different visual displays were evaluated for their effectiveness in the acquisition of flight tasks in a simulator. The control condition had a wide field-of-view, a horizon and a checkerboard ground plane that obeyed laws of motion and perspective. The experimental displays were: (1) a narrow field-of-view with horizon and checkerboard ground plane; (2) an outside viewpoint of an aircraft; and (3) a display that consisted only of normal flight instruments. Flight-naive subjects were taught to fly straight-and-level for twenty trials with either the control or one of the experimental displays and then tested for twenty trials on the control display. Training, transfer, and differential transfer performance was examined. GRA

**N82-29000#** Naval Biodynamics Lab., New Orleans, La.
**TASK ANALYSIS AND THE ABILITY REQUIREMENTS OF TASKS: COLLECTED PAPERS**
R. H. Shannon and Robert C. Carter Sep. 1981 27 p refs
(AD-A111181; NBDL-81R009) Avail: NTIS HC A03/MF A01 CSCL 05/9

This is a collection of papers on the topic of using task analysis to identify the abilities required for jobs. Identification of ability requirements is a first step in the process of assembling performance tests that are related to a particular job. Once assembled such tests could be used for many purposes. One use would be selection of personnel who are especially gifted with the required attributes. The use to which the authors' efforts are directed is environmental research. Environmental research is the study of human performance in unusual environments (e.g., vibration, ship motion, impact) in order to determine whether and to what degree the environment affects performance. Such research is more relevant to the Navy when the human performance studied is related to Navy jobs. Author (GRA)

**N82-29001#** Forschungsinstitut fuer Anthropotechnik, Bonn (West Germany).
**THE RANKING OF DISPLAYS BASED ON TRANSINFORMATION [DIE BEWERTUNG VON ANZEIGEN DURCH DEN TRANSINFORMATIONSFLUSS]**
K.R. Kimmel Nov. 1981 56 p refs In GERMAN; ENGLISH summary
(FB-52) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10

Transinformation as a means to discriminate between alternative display configuration with a compensatory control task was investigated. Root-mean-square (rms) control error was used for comparison purposes. The dynamics of the controlled elements and the bandwidths of the stochastic disturbance functions served as independent parameters in the experiment. Results from both measures, in general, show good agreement, being somewhat more consistent with transinformation, the superiority of which can clearly be seen when an additional auditory of visual discrete supervisory task is added. Control rms did not permit the construction of a unitary total performance measure in multiple task situations. Transinformation, on the other hand, confirmed the rankings of the different display configurations which were obtained for the pure analog compensatory manual control task. Author (ESA)

**N82-29002*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**THERMAL GARMENT Patent**
James H. Hopper, inventor (to NASA) (United Aircraft Corp., East Hartford, Conn.) Issued 3 Jan. 1967 6 p Filed 3 Sep. 1964 Sponsored by NASA
(NASA-Case-XMS-03694-1; US-Patent-3,295,594; US-Patent-Appl-SN-394280; US-Patent-Class-165-46) Avail: US Patent and Trademark Office CSCL 06K

An anthropomorphic thermal garment made entirely of fluid-carrying tubing, joined in such a way that the tubes form a network or mesh fabric, is described. N.W.

**N82-29003*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
**EVALUATION OF ENGINEERING FOODS FOR CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS) Final Report, 1 Feb. 1980 - 1 Mar. 1982**
Marcus Karel 1 Mar. 1982 162 p refs
(Contract NAS9-16008)
(NASA-CR-167626; NAS 1.26:167626) Avail: NTIS HC A08/MF A01 CSCL 06K

A nutritionally adequate and acceptable diet was evaluated and developed. A design for a multipurpose food plant is discussed. The types and amounts of foods needed to be regenerated in a partially closed ecological life support system (PCELSS) were proposed. All steps of food processes to be utilized in the multipurpose food plant of PCELSS were also considered. Equipment specifications, simplification of the proposed processes, and food waste treatment were analyzed. N.W.

**N82-29004*#** Little (Arthur D.), Inc., Cambridge, Mass.
**NUTRITION AND FOOD TECHNOLOGY FOR A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**
Peter E. Glaser and Judith A. Mabel May 1981 96 p refs

(Contract NAS9-15652)
(NASA-CR-167392; NAS 1.26:167392) Avail: NTIS HC A05/MF A01 CSCL 06K

Food technology requirements and a nutritional strategy for a Controlled Ecological Life Support System (CELSS) to provide adequate food in an acceptable form in future space missions are discussed. The establishment of nutritional requirements, dietary goals, and a food service system to deliver acceptable foods in a safe and healthy form and the development of research goals and priorities were the main objectives of the study. M.D.K.

**N82-29005*#** California Univ., Berkeley. Dept. of Mechanical Engineering.
**A DESIGN METHODOLOGY FOR NONLINEAR SYSTEMS CONTAINING PARAMETER UNCERTAINTY: APPLICATION TO NONLINEAR CONTROLLER DESIGN**
Gary Young May 1982 90 p refs
(Contract NCC2-67)
(NASA-CR-166358; NAS 1.26:166358) Avail: NTIS HC A05/MF A01 CSCL 05H

A design methodology capable of dealing with nonlinear systems, such as a controlled ecological life support system (CELSS), containing parameter uncertainty is discussed. The methodology was applied to the design of discrete time nonlinear controllers. The nonlinear controllers can be used to control either linear or nonlinear systems. Several controller strategies are presented to illustrate the design procedure. E.A.K.

**N82-29006*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
**EVALUATION OF ENGINEERING FOODS FOR CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEMS (CELSS)**
Marcus Karel Jun. 1982 92 p refs
(Contract NAS9-16008)
(NASA-CR-166359; NAS 1.26:166359; CELSS-13) Avail: NTIS HC A05/MF A01 CSCL 06K

The feasibility of developing acceptable and reliable engineered foods for use in controlled ecological support systems (CELSS) was evaluated. Food resupply and regeneration are calculated, flow charts of food processes in a multipurpose food pilot plant are presented, and equipment for a multipurpose food pilot plant and potential simplification of processes are discussed. Food-waste treatment and water usage in food processing and preparation are also considered. A.R.H.

**N82-29007#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering/Operations Research.
**RULE-BASED PROGRAMMING FOR HUMAN-COMPUTER INTERFACE SPECIFICATION**
John W. Roach and Glenn S. Fowler Jan. 1982 81 p refs
(Contract N00014-81-K-0143; NR Proj. SR0-101)
(AD-A113036; CSIE-82-5) Avail: NTIS HC A05/MF A01 CSCL 09/2

An implementation of a rule-based language related to PROLOG for the specification of human-computer interfaces is described. It is based not upon von Neumann computer architectures but rather upon Post production systems or Markov algorithms, which are the foundations of computer science. Author

**N82-29008#** Naval Submarine Medical Research Lab., Groton, Conn.
**COLD WEATHER GOGGLES. 2: PERFORMANCE EVALUATION Interim Report**
S. M. Luria 23 Mar. 1982 17 p refs
(M0095PN001)
(AD-A114067; NSMRL-978) Avail: NTIS HC A02/MF A01 CSCL 06/17

The performance of various tasks of importance to the Marines was compared when the subjects were wearing different goggles designed to protect the eyes from the cold. Color perception through yellow goggles and riflery through the most distorted goggles were degraded, but there were no significant impairments in acuity, depth perception, or vision through binoculars. The optical standards adhered to in the manufacture of commercial goggles appears to permit the satisfactory performance of practical tasks. Author (GRA)

**N82-29009#** Naval Biodynamics Lab., New Orleans, La.
**BIOMECHANICAL ANALYSIS OF TASKS INVOLVING MANUAL MATERIALS HANDLING**
Richard H. Shannon Feb. 1982 27 p refs
(AD-A113955; NBDL-82R001) Avail: NTIS HC A03/MF A01 CSCL 05/5

Biomechanics and their relationships with manual materials handling, sex differences and training are discussed. A factor analytic model of lifting in the floor knuckle and knuckle shoulder regimens under experimental conditions is considered. Sixteen subjects were divided equally into four groups of males trained/untrained and females trained/untrained. Results indicated that (1) there were different motion patterns among the four groups, (2) male movements approximated the trained and female movements the untrained conditions, and (3) trained individuals demonstrated more efficient and coordinated lifts. Training programs are recommended in the working environment if women are expected to lift moderately heavy loads because of their lower physical fitness and coordination when compared to men. This statement is further supported by the second paper, which conducted a critical incident technique of 484 strain/sprain/overexertion injuries of naval civilian government workers was conducted. Results indicated that males had significantly more injuries to the back, to craftsmen/operatives/laborers, using heavy/very heavy weight. GRA

**N82-29010#** Purdue Univ., Lafayette, Ind. School of Engineering.
**DEVELOPMENT OF A METHODOLOGY FOR ASSESSING AIRCREW WORKLOADS Final Report, Oct. 1978 - Dec. 1980**
James R. Buck, James W. Barany, Mark L. Lehto, David M. Ings, David R. Payne, Roy D. Nixon, and William H. Grosse Wright-Patterson AFB, Ohio Aerospace Medical Research Labs. Nov. 1981 95 p refs
(Contract F33615-78-D-0617; AF Proj. 7184)
(AD-A114364; AFAMRL-TR-81-50) Avail: NTIS HC A05/MF A01 CSCL 05/5

The adaptability of industrial methods for setting job and time standards to workload assessment requirements was investigated. Methods considered included direct and indirect time study, synthetic time systems, standard data systems, information content analysis, work sampling and job evaluation. Conventional methods were found to be deficient in accounting for task time variability, divided-attention effects, and cognitive demands which are regarded as critical to effective air crew workload assessment. A combination of synthetic time and standard data system methodologies was proposed as an effective approach to the problem. Three experiments were conducted to evaluate the feasibility of developing a Synthetic Data System(SDS) consistent with workload assessment needs. Swithing, communication and perceptual-mediational tasks were paired with tracking to create divided-attention demands characteristic of pilot workloads. Regression analyses showed that significant amounts of variance in task time requirements and error rates could be accounted for in terms of task and man-machine interface design variables. Development of an SDS on the basis of the performance of aircrew members in aircraft simulators is recommended. GRA

**N82-29011#** Texas Univ., Austin. Center for Cybernetic Studies.
**AIRCRAFT AND CREW SCHEDULING DURING AIRLIFT OPERATIONS**
R. D. Armstrong (Georgia Univ.), R. D. Charnes, and S. Samn (School of Aerospace Medicine) Nov. 1981 21 p refs
(Contract N00014-75-C-0569)
(AD-A114114; CCS-402) Avail: NTIS HC A02/MF A01 CSCL 12/2

The Air Force is frequently placed in a situation where a large quantity of goods must be transported between various locations in a specified time period by Air Force personnel. The goods are of different and interrelated types; thus, the sequence of missions is specified to maintain a proper balance of goods at each location. In addition to aircraft maintenance, health and alertness maintenance for pilots and personnel is a vital consideration in scheduling. Nevertheless, economy in operations needs to be demonstrated. Thus, the problem addressed in this paper is one of minimizing the number of crews used in the airlift, subject to crew rest requirements and the completion of all missions within the specified time frame. Author (GRA)

**N82-29012#** Wright State Univ., Dayton, Ohio. School of Medicine.
**FLIGHT CREWMEMBER WORKLOAD EVALUATION** Final Report, Aug. 1980 - Apr. 1981
Richard L. Sulzer, William J. Cox, and Stanley R. Mohler Apr. 1981 208 p refs
(Contract F33615-80-K-3627)
(AD-A114167; DOT-FAA-RD-82-21; DOT-FAA-ASF-82-1)
Avail: NTIS HC A10/MF A01 CSCL 01/3

This is a report on transport category airplane flight crew workload measurement techniques as used in cockpit development and aircraft certification tests by major U.S. airframe manufacturers. It reviews the fundamentals of: crew size certification; workload measures and criteria; workload studies made during aircraft design; and workload studies made after the design has been established, including those used in flight test. Certain documentation practices are identified. The limitations of the currently used practices and the needs for improved workload measurement techniques are addressed. Author (GRA)

**N82-29069#** Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
**TRAINING OF PERSONNEL SPECIALIZED IN CARTOGRAPHY [AUSBILDUNG VON KARTOGRAPHISCHEM FACHPERSONAL]**
Gisela Beer *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 55-60 In GERMAN Original contains color illustrations

Avail: NTIS HC A06/MF A01

Training, since 1956, at the Berlin branch office of the Institute for Applied Geodesy is reviewed. The evolution of training requirements is discussed. Recruiting and hiring practices are summarized. Training at the university and professional levels is outlined. Author (ESA)

**N82-29648*#** George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.
**BIOMEDICAL RESEARCH PUBLICATIONS: 1980 - 1982** Final Report
Linda Pleasant and Letty Limbach Washington NASA Jul. 1982 49 p
(Grant NASw-3165)
(NASA-CR-3587; NAS 1.26:3587) Avail: NTIS HC A03/MF A01 CSCL 06C

Publications concerning the major physiological and psychological problems encountered by man when he undertakes space flight are listed. Nine research areas are included: cardiovascular deconditioning, motion sickness, bone alterations, muscle atrophy, blood cell alterations, fluid and eletrolyte changes, radiation effects and protection, behavior and performance, and general biomedical research. N.W.

**N82-29649#** Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div.
**HYPO-AND HYPERGLYCEMIA IN RATS: EFFECTS ON THE ABILITY TO WORK IN THE HEAT**
Ralph P. Francesconi and Milton Mager 3 Feb. 1982 25 p refs
(DA Proj. 3E1-61102-BS-10)
(AD-A111711; USARIEM-M-15/82) Avail: NTIS HC A02/MF A01 CSCL 06/19

To investigate the hypothesis that circulating glucose levels may affect exercise performance and the severity of hyperthermic injury, rats were made hypoglycemic (IV insulin, 4U) or hyperglycemic (IP glucose, 750mg) before exercise in the heat to hyperthermic exhaustion (Tre = 42.5 -43 C). The endurance capacity of rats administered glucose was significantly greater than that of insulin treated, while neither was different from saline treated controls. Hematocrit levels were unaffected by exercise in control and insulin treated rats, but were significantly increased in the glucose treated. Lactate levels were increased postrun in all groups, and these increments were exacerbated in glucose treated rats. Glucose levels prerun were decreased by insulin and increased by glucose, and remained depressed postrun in the insulin treated group. Potassium concentrations were reduced by insulin administration. Creatine phosphokinase, urea nitrogen, and creatinine were increased postrun in all groups. Mortality rates following heat/exercise injury were unaffected by glucose levels. We concluded that while hyperglycemic rats had increased endurance when compared to hypoglycemic animals, the severity of the hyperthermic injury was unaffected by circulating glucose levels. Author (GRA)

**N82-29650#** VSE Corp., Alexandria, Va.
**TECHNICAL ASSESSMENT OF THE PREVENTION OF MICRO-FOULING ON OTEC HEAT-TRANSFER SURFACES THROUGH THE USE OF ULTRAVIOLET RADIATION** Final Report
G. A. Garrigan, R. P. Schmitt, and V. J. Ciccone (Ciccone (V. J.) and Associates, Inc., Woodbridge, Va.) Sep. 1981 95 p refs
(Contract DE-AC02-78ET-21002)
(DE82-005489; DOE/ET-21002/T21) Avail: NTIS HC A05/MF A01

To reduce or eliminate biofouling by microorganisms, seawater entering heat exchangers is sterilized (or at least sanitized) by UV radiation at 253.7 nm. The feasibility of applying this technology to OTEC is examined. Calculations based on the Lambert-Beer equation and reasonable assumptions about seawater quality and the intensity of irradiation obtainable from a UV lamp suggest seawater is transparent enough to a collimated beam of UV light to deliver effective germicidal doses to nearly 150 cm under some conditions. However, the practical limit on the depth of effective radiation from commercial lamps is severely restricted by many factors including the natural divergence of light, absorption and scattering in the media, intensity of radiation from the light source and so forth. Even under very favorable conditions a common design allowing UV light to penetrate 30 cm of water would have to permit the water at that distance to be in contact with the light for 20 seconds or so to deliver the germicidal effect of high quality sanitization but not necessarily sterilization. DOE

**N82-29651#** Argonne National Lab., Ill. Components Technology Div.
**OTEC-1 POWER SYSTEM TEST PROGRAM: BIOFOULING AND CORROSION MONITORING ON OTEC-1**
A. P. Gavin and T. M. Kuzay Sep. 1981 53 p refs
(Contract W-31-109-eng-38)
(DE82-007035; ANL/OTEC-BCM-027) Avail: NTIS HC A04/MF A01

Biofouling and corrosion experiments performed on board the ocean energy converter during the OTEC-1 deplovment are summarized. The equipment installed for the experiments, details of the operating history of the experiments, and results obtained are described. DOE

**N82-29652#** California Univ., Berkeley. Lawrence Berkeley Lab. Chemical Biodynamics Div.
**ORIENTATION AND ENERGY-TRANSFER STUDIES ON CHLOROPHYLL IN THE PHOTOSYNTHETIC MEMBRANE** Ph.D. Thesis
John Arthur Nairn Dec. 1981 216 p refs
(Contract W-7405-eng-48)
(DE82-010180; LBL-13827) Avail: NTIS HC A10/MF A01

The two methods of study used for the light reactions of photosynthesis are orientation dependent spectroscopy and picosecond resolution of the fluorescence decay kinetics. Analysis of spectroscopic measurements on complex partially ordered ensembles, such as photosynthetic systems, is usually limited by knowledge of the orientational distribution function. A new method of parametrically representing the distribution function using a physical model of the partially ordered ensemble is described. The parametric representation of the distribution function is the density of states function. Many formulas are included which can be used to calculate density of state functions for a large range of problems. Fluorescence decay kinetics in chloroplasts from green plants and algae are investigated using a synchronously pumped, mode-locked dye laser as an excitation source. DOE

**N82-29653#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT. LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 17**
2 Aug. 1982 110 p refs Transl. into ENGLISH from various Russian publications
(JPRS-81419) Avail: NTIS HC A06/MF A01

Advances in biotechnology and radiation biology are addressed. Emphasis is placed on analysis of the environment to detect air and water pollution and the biological effects of irradiation and long term exposure to low doses of gamma radiation. Other topics covered include biochemistry, medicine, microbiology, pharmacology, physiology and psychiatry.

**N82-29855#** Joint Publications Research Service, Arlington, Va.
**ATTENUATION OF RADIOPROTECTIVE EFFECTS OF ACUTE HYPOXIA ON ANIMALS ADAPTED TO HIGH ALTITUDES**
P. Kazymbetov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 76-79 refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 27, no. 3, Mar. 1982 p 60-62

Avail: NTIS HC A06/MF A01
The range of modification of radiosensitivity by acute hypoxia (6% oxygen) in animals adapted to high altitudes was investigated. Experiments were conducted on mongrel white rats and mice kept at an altitude of 3340 m above sea level for 40 days and on a control group kept at 800 m above sea level. The animals were irradiated in air and under hypoxic conditions. Animal survival for 30 days after irradiation and quantity of bone marrow cells in one thigh on the third postirradiation day served as criteria of radiosensitivity. The toxicity of acute hypoxia for control and adapted animals was also tested. The attenuation of radioprotective effects of acute hypoxia was demonstrated. It was also demonstrated that the diminished effect of acute hypoxia persists for several days after adaptation. Also, results show that adapted animals were twice as resistant to acute hypoxia as control animals. J.M.S.

**N82-29856#** Joint Publications Research Service, Arlington, Va.
**CYTOGENETIC ANALYSIS OF PERIPHERAL BLOOD LYMPHOCYTES OF INDIVIDUALS EXPOSED TO LOW DOSES OF IONIZING RADIATION**
S. P. Petrova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 80-84 refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 27, no. 3, Mar. 1982 p 70-72

Avail: NTIS HC A06/MF A01
The peripheral blood of 30 men who had been exposed to external gamma radiation over an extended period of time was analyzed. The incidence of chromosomal abberrations in the peripheral blood lymphocytes was examined. Findings revealed that there was no appreciable change in the incidence of structural abberations in peripheral blood lymphocytes with chronic exposure to radiation in low doses as compared to the spontaneous level. J.M.S.

**N82-29857#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT. LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 18**
3 Aug. 1982 111 p refs Transl. into ENGLISH from various Russian publications
(JPRS-81428) Copyright. Avail: Issuing Activity
Investigations in virology, cloning, echolocation, artificial hearts, and medical demography are reported. The effects of laser transmission on humans, analysis of taste perception, and the use of computer to quantitatively estimate hoarseness are other areas of interest discussed.

**N82-29858#** Joint Publications Research Service, Arlington, Va.
**THEORETICAL AND PRACTICAL ASPECTS OF USING ACOUSTIC REPELLANTS TO SCARE BIRDS. PART 1: INTERSPECIFICITY AND GEOGRAPHIC (REGIONAL) DISTINCTIONS OF ACOUSTIC REPELLANTS**
A. V. Tikhonov and V. S. Shevyakov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 43-48 refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 1, Jan. 1982 p 45-49

Avail: Issuing Activity
The interspecificity of alarm and distress signal effects on Larines, Corvidae and starlings was investigated as well as geographic aspects of using these signals as acoustic repellants. It was established that repellant reactions are induced in birds by signals not only of closely related species, but of systematically distant groups that are biocenotically close neighbors. The interspecificity of repellant signals is manifested the most during the nesting period. Author

**N82-29859#** Joint Publications Research Service, Arlington, Va.
**ELECTROMETRIC INVESTIGATION OF HUMAN GUSTATORY ANALYZER UNDER NORMAL CONDITIONS AND IN SIMULATED WEIGHTLESSNESS**
I. Ya. Yakovleva *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 73-76 refs Transl. into ENGLISH from Otorinolaringol. (USSR), no. 2, Mar. - Apr. 1982 p 15-17

Avail: Issuing Activity
Altered perception of the taste of food took place in a number of cosmonauts and also in healthy individuals when some of the effects of weightlessness were simulated on Earth. Electrometrical investigation of taste was used to study the gastrolingual reflex and apparently can be performed by the subjects themselves. In this connection, the method is of interest for space medicine. A.R.H.

**N82-29860#** Joint Publications Research Service, Arlington, Va.
**SIGNIFICANCE OF MINUTE VOLUME PARAMETERS TO EVALUATION OF VESTIBULAR STABILITY**
A. S. Gusarov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-18428) 3 Aug. 1982 p 88-91 Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 8, Aug. 1981 p 48-50

Avail: Issuing Activity
Respiration rate, minute volume, heart rate, and EKG were recorded in 100 men between 22 and 35 years of age using an automatic vestibular chair to which was connected a Fizilog instrument with Reservy unit, a digital printer, and a 12 channel magnetoelectric oscillograph. A 5 minute test for endurance of cumulative Coriolis accelerations with intermittent exposure was used to study vestibulovegetative reflexes. Subjects were grouped according to: (1) high vestibulovegetative reactions; (2) moderate stability; and (3) poor motion tolerance. More than 3,000 vestibulovegetative reactions were recorded. Results show that the first group of subjects endured the 5 min test without complaints or external vestibulovegetative manifestations. The second group presented moderate pallor, perspiration and nausea, mainly in the 3d-5th min before stopping and after stops. Marked autonomic reactions were (pallor, cold sweat, nausea, vomiting) were observed in the third group either immediately after stopping the first time, or after the second-third time. A.R.H.

**N82-29861#** Joint Publications Research Service, Arlington, Va.
**PHASE ANALYSIS OF DYNAMICS OF GALVANIC SKIN RESPONSES IN MAN**
A. A. Krauklis, A. A. Aldersons, and I. A. Spandega *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 92-95 refs Transl. into ENGLISH from Iz. Akad. Nauk Latv. SSR (USSR), no. 2, Feb. 1981 p 123-125
Avail: Issuing Activity
The influence of the heat factor and, in particular, ambient temperature on the appearance and dynamics of GSR in different parts of the human body both in a state of relative rest and with graded mental emotional and physical loads was studied. Results obtained using 1140 subjects of both sexes, ranging in age from 18 to 86 years, show that the dynamics of development of the galvanic skin response presents distinct phases which depend on ambient temperature, and emotional and physical tension. It was established that GSR dynamics undergo five phases with rapid elevation of temperature. A.R.H.

**N82-29862*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ACOUSTIC TOOTH CLEANER Patent**
Joseph S. Heyman, inventor (to NASA) Issued 25 May 1982 5 p Filed 14 Aug. 1980 Supersedes N81-12734 (19 - 03, p 0392)
(NASA-Case-LAR-12471-1; US-Patent-4,331,422; US-Patent-Appl-SN-178193; US-Patent-Class-433-125; US-Patent-Class-433-118; US-Patent-Class-433-86;

US-Patent-Class-128-62A) Avail: US Patent and Trademark Office CSCL 06B

An acoustic oral hygiene unit is described that uses acoustic energy to oscillate mild abrasive particles in a water suspension which is then directed in a low pressure stream onto the teeth. The oscillating abrasives scrub the teeth clean removing food particles, plaque, calculous, and other foreign material from tooth surfaces, interproximal areas, and tooth-gingiva interface more effectively than any previous technique. The relatively low power output and the basic design makes the invention safe and convenient for everyday use in the home without special training. This invention replaces all former means of home dental prophylaxis, and requires no augmentation to fulfill all requirements for daily oral hygienic care.

Official Gazette of the U.S. Patent and Trademark Office

**N82-29863*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**IMPLANTABLE ELECTRICAL DEVICE Patent**

Murzban D. Jhabvala, inventor (to NASA) Issued 5 Jan. 1982 5 p Filed 27 May 1980 Supersedes N80-27073 (18 - 17, p 2329)
(NASA-Case-GSC-12560-1; US-Patent-4,308,868; US-Patent-Appl-SN-153246; US-Patent-Class-128-421) Avail: US Patent and Trademark Office CSCL 06B

A fully implantable and self contained device is disclosed composed of a flexible electrode array for surrounding damaged nerves and a signal generator for driving the electrode array with periodic electrical impulses of nanoampere magnitude to induce regeneration of the damaged nerves.

Official Gazette of the U.S. Patent and Trademark Office

**N82-29864#** Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

**THE UTILIZATION OF MACROMOLECULES IN BLOOD PURIFICATION SYSTEMS**

K. Takakura and Toshihide Nakashima 1982 31 p refs Transl. into ENGLISH from Kagaku Zokan (Japan), no. 84, 1980 p 141-152
(NRC/CNR-TT-2021; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

The macromolecular membranes and adsorbents that play essential roles in blood purification sytems, as well as materials that are used to coat the adsorbents, are discussed. The KF 101 dialyzer employs hollow fibers made of an ethylene-vinyl alcohol copolymer (EVA). The DHP-1 blood purifier utilizes activated charcoal coated with hydroxyethyl methacrylate (HEMA). These macromolecules are discussed from the standpoint of their medical utility. N.W.

**N82-29865*#** Technology, Inc., Houston, Tex. Life Science Div.

**NEUROCHEMICAL BACKGROUND AND APPROACHES IN THE UNDERSTANDING OF MOTION SICKNESS Final Report**

Randall Lee Kohl Washington NASA Jul. 1982 54 p refs
(Contract NAS9-14880)
(NASA-CR-3569; NAS 1.26:3569; S-515) Avail: NTIS HC A04/MF A01 CSCL 06P

The problems and nature of space motion sickness were defined. The neurochemical and neurophysiological bases of vestibular system function and of the expression of motion sickness were reviewed. Emphasis was given to the elucidation of the neuropharmacological mechanisms underlying the effects of scopolamine and amphetamine on motion sickness. Characterization of the ascending reticular activating system and the limbic system provided clues to the etiology of the side effects of scopolamine. The interrelationship between central cholinergic pathways and the peripheral (autonomic) expression of motion sickness was described. A correlation between the stress of excessive motion and a variety of hormonal responses to that stress was also detailed. The cholinergic system is involved in the efferent modulation of the vestibular hair cells, as an afferent modulator of the vestibular nuclei, in the activation of cortical and limbic structures, in the expression of motion sickness symptoms and most likely underscores a number of the hormonal changes that occur in stressful motion environments. The role of lecithin in the regulation of the levels of neurotransmitters was characterized as a possible means by which cholinergic neurochemistry can be modulated. Author

**N82-29866#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**DETERMINATION OF MAXIMAL AEROBIC POWER DURING UPPER BODY EXERCISE**

Michael N. Sawka, Michael E. Foley, Nancy A. Pimental, Michael M. Toner, and Kent B. Pandolf 3 Feb. 1982 26 p refs
(AD-A111712; USARIEM-M-14/82) Avail: NTIS HC A03/MF A01 CSCL 06/19

The purpose of this investigation was to evaluate four protocols for their effectiveness in eliciting maximal aerobic power (peak VO2) during arm crank exercise. Comparisons were made between: (1) a continuous (CON) and an intermittent (INT) protocol (both employed a crank rate of 50 rpm), and (2) the CON protocol employing crank rates of either 30, 50, or 70 rpm. For the first group of experiments no significant differences were found between the Con and INT protocols for peak VO2, maximal pulmonary ventilation (VEmax), maximal heart rate (HRmax) or maximal blood lactate (LAmax) responses. For the second group of experiments, the CON-50 was compared to the CON-30 and CON-70 protocols. In comparison to the CON-50, significantly higher peak VO2 (+10%) and VEmax (+14%) responses were elicited by the CON-70 protocol, whereas significantly lower peak VO2 (-11%), VEmax (-23%), HRmax (-8%), and LAmax (-29%) responses were elicited by the CON-30 protocol. These data indicate that for arm crank exercise the combination of a continuous design and a crank rate of 70 rpm provides the most effective protocol to elicit peak VO2 values. Author (GRA)

**N82-29867#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**ALCOHOL-INDUCED PHYSIOLOGICAL DISPLACEMENTS AND THEIR EFFECTS ON FLIGHT RELATED FUNCTIONS**

Michael T. Lategola, Peggy J. Lyne, and Mary J. Burr Mar. 1982 22 p refs
(AD-A114919; FAA-AM-82-3) Avail: NTIS HC A02/MF A01 CSCL 06/19

Tolerances of human subjects for orthostasis and physical work were determined at a simulated altitude of 3,048 m. Orthostasis was induced with a lower body negative pressure (LBNP) device and physical work was done on a pedal ergometer. Altitude was simulated in a hypobaric chamber. Tests were carried out under two experimental conditions: (1) after subjects drank an alcoholic beverage, or (2) after subjects drank a placebo beverage (no alcohol). The alcoholic beverage produced blood alcohol concentrations (BAC's) of about 90 mg/100 ml of blood (90 mg percent). At altitude, arterial oxyhemoglobin saturation (HbO2) remained adequately compensated but was lower after alcohol than after placebo intake. Arithmetic and eye/hand coordination performances were both significantly decreased after school. Ergometry, after alcohol, was well tolerated despite some decreased cardiorespiratory efficiency. The LBNP applied around peak BAC at altitude was tolerated without subjectively adverse symptoms despite significant decreases in several cardiovascular parameters. Cardiovascular adequacy along with maintained plasma volume around peak BAC appeared to be temporarily protective against orthostatic incapacitation during LBNP. Reversal of this temporary orthostatic protection during BAC recession is possible. Author (GRA)

**N82-29868#** Dayton Univ., Ohio. Research Inst.

**SEGMENTATION AND ANALYSIS OF STEREOPHOTOMETRIC BODY SURFACE DATA Final Report**

L. Douglas Baughman Wright-Patterson AFB, Ohio AMRL Apr. 1982 193 p refs
(Contract F33615-78-C-0504; AF Proj. 7231)
(AD-A114916; UDR-TR-81-51; AFAMRL-TR-81-96) Avail: NTIS HC A09/MF A01 CSCL 06/2

A stereophotometric data set, describing the body surface of a subject, was segmented into nineteen groups of stereophotometric data, the data in each group describing the surface of a body segment. The process was repeated for a total of 59 such data sets. The data resulting from each of these segmentation processes were then analyzed for inertial properties and location and orientation of both anatomical and principal axis systems. The accumulated body volume as a function of vertical distance from the floor was also tabulated for all the data sets.

Author (GRA)

**N82-29869#** Monsanto Research Corp., Dayton, Ohio.

**SUPERIOR HEAT-TRANSFER FLUIDS FOR SOLAR HEATING AND COOLING APPLICATIONS. RESULTS OF ACUTE ORAL TOXICITY DETERMINATIONS Final Report, 15 Sep.**

1980 - 30 Apr. 1981
Leo Parts and David L. Conine Nov. 1981 127 p Prepared jointly with Hill Top Research, Cincinnati
(Contract DE-AC04-78CS-35356)
(DE82-003071; MRC-DA-1096-Vol-2) Avail: NTIS HC A07/MF A01

Acute oral toxicity test were performed on heat transfer fluids. Results obtained for 23 fluid samples are presented.
L.F.M.

**N82-29870#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### PHYSIOPATHOLOGY AND PATHOLOGY OF SPINAL INJURIES IN AEROSPACE MEDICINE

R. P. Delahaye and R. Auffret Feb. 1982 338 p refs
(AGARD-AG-250(Eng); ISBN-92-835-1415-7) Avail: NTIS HC A15/MF A01

The anatomy and biomechanics of the spine are reviewed and spinal stress in flight is described. The aetiology and pathogenesis of spinal fracture; the clinical examination and radiology of spinal trauma; postural disorders of helicopter and combat aircraft pilots; and flight fitness are considered. Medicolegal aspects of spinal disorders, including intervertebral arthritis, spondylolisthesis, and inflammatory rheumatic conditions are addressed. For individual titles, see N82-29871 through N82-29892.

**N82-29871#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### ANATOMY OF THE SPINE

C. Kleitz and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 9-28

Avail: NTIS HC A15/MF A01

The embryology of the spine; general and special regional characteristics of vertebrae; interconnections and articulations, the spine as a whole, and the spine in the seated position are depicted in anatomical drawings and described. A.R.H.

**N82-29872#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### BIOMECHANICS OF THE SPINE

C. Kleitz and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 29-45

Avail: NTIS HC A15/MF A01

The spine has at least three basic biomechanical functions: (1) transmit the weight and the flexing movements of the head and the trunk to the pelvis; (2) allow physiological movement between the head, trunk, and pelvis; and (3) protect the spinal cord from trauma caused by forces and movements. The functional biomechanics of the intervertebral disk, the intervertebral ligaments, the vertebrae, and the spinal column are illustrated and discussed. The role of the thoracic cage and muscles is also examined. A.R.H.

**N82-29873#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### SPINAL STRESSES IN FLIGHT

R. Auffret and H. Vieillefond *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 47-54

Avail: NTIS HC A15/MF A01

The spine of a pilot is subjected to two types of stresses: those inherent in flight which are of relatively low intensity and are related to the time for which they act; and those which are uncommon but of very high intensity whose effects are related to the mechanical strength of the spinal column and can lead to fractures. The former represent the problem of fatigue of materials; the latter the problem of the strength of materials. The physiological effects of aircraft acceleration and vibration during flight are analyzed. The mechanical effects on the human body of the very high accelerations (impacts) associated with ejection from high performance aircraft at high speed and during crash landings away from prepared runways are examined.
A.R.H.

**N82-29874#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### THEORIES OF THE PATHOGENESIS OF FRACTURES OF THE SPINE

R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 57-59

Avail: NTIS HC A15/MF A01

The mechanisms of fractures of the thoraco-lumbar spine and of the cervical spine are distinguished. The different aetiological circumstances in which traumatic lesions occur (crash, parachuting, ejection, accidents in flight, accidents on centrifuges and sleds) are examined. Clinical studies and practical methods of examination that are often neglected are considered. Radiology must be carried out early, using optimal techniques to yield radiographs that, with the clinical examinations, can facilitate the establishment of an accurate inventory of the lesions. The numerous after-effects of trauma must be detailed, for they produce a very special clinical and radiological picture with which every flight surgeon should be thoroughly familiar. A.R.H.

**N82-29875#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### AETIOLOGY AND PATHOGENESIS

R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 60-65

Avail: NTIS HC A15/MF A01

Records of accident investigations of light civil aircraft, gliders, military aircraft, and civil and military transport aircraft show that the pathogenesis of fractures of the vertebral column and the associated lesions resulting from crashes is almost identical. The localization of spinal fractures in crashes, the forces and accelerations in crashes, and the effect of deceleration when the body is restrained by an abdominal belt are considered.
A.R.H.

**N82-29876#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### HELICOPTER ACCIDENTS

B. Vettes and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 66-71

Avail: NTIS HC A15/MF A01

The uses of helicopters in civil and military operations are reviewed and it is shown that the advantages of maneuverability, vertical take-off and landing, hovering, and the need for unsophisticated ground base contribute to the frequent, often serious accidents of these aircraft. Statistical studies of civil and military helicopters, and the distribution of vertebral fractures in helicopter accidents are discussed. The schematic division of crashes into ground impact in autorotation and crash with loss of control of aircraft corresponds to a distinction between crashes with the possibility of survival and unsurvivable crashes. The pathogenesis of vertebral lesions is discussed for crashes in which the impact is purely vertical (accident in autorotation) and crashes with a significant horizontal impact component (poor chance of survival). Case histories of crash injuries are used to show that the risk of fatal accidents, which is 0.34 per 10,000 flying hours, must be reduced. A.R.H.

**N82-29877#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

### EJECTION OF PILOTS FROM COMBAT AIRCRAFT

R. P. Delahaye, R. Auffret, and B. Vettes *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 72-96
Avail: NTIS HC A15/MF A01

The history of scientific studies of pilot escape, especially at high speeds from combat aircraft, is reviewed and the principles of the ejection seat are examined. The different phases of ejection (initiation; seat firing and egress from the aircraft; separation of the seat; landing; survival; and rescue) are described. Normal configurations, abnormal configurations and the extraction (YANKEE system) are discussed as well as the overall results of ejection and the results as a function of in-flight factors. The distribution of ejection lesions, and the pathogenic mechanisms of spinal fractures during ejection are examined. Parachute opening shock and pathological factors associated with landing are also considered. A.R.H.

**N82-29878#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**PARACHUTING**
A. Leger and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 97-121

Avail: NTIS HC A15/MF A01
The physiopathology and etiology of parachute descents are examined during (1) leaving the aircraft to parachute opening; (2) parachute opening; and (3) descent on the deployed parachute. Military parachuting techniques and training of military parachutists; and fracture and trauma of the spine during parachuting as a means of transport are examined. Other lesions and traumatic sequelae of parachuting are described. General conditions of parachuting as a sport, the equipment used, and spinal trauma in sport parachuting are also covered. Hang gliding and the limits of human tolerance for impacts in free fall are discussed. A.R.H.

**N82-29879#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**LIMITS OF HUMAN TOLERANCE FOR IMPACTS IN FREE FALL**
*In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 122-126

Avail: NTIS HC A15/MF A01
Various techniques used to study the degree of human resistance to impact during an unimpeded fall, jump, or dive from a known point to a know point are described. The physical factors which influence the nature, size, and severity of the lesions received are amplitude, direction of forces, distribution of forces, area of application, and duration. Biological factors (physical condition) are also closely related to impact tolerance. Injuries resulting from impacts into water and at terminal velocity are reported from case histories. A.R.H.

**N82-29880#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**FRACTURES OF THE SPINE IN FLIGHT**
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 127-131

Avail: NTIS HC A15/MF A01
Case histories show that fractures of the spine can occur in the pilot of combat aircraft during rapid vibrational phenomena (induced oscillation) and with inadvertent unlocking of the seat, an event which produces additional accelerations which lead to a sudden compression of the vertebral column. During turbulence, a flight attendant thrown against the wall or the seats of an aircraft sometimes receives a fracture of the spine. More rarely, cervical sprains occur during aerobatics. A.R.H.

**N82-29881#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**ACCIDENTS IN CENTRIFUGES AND EXPERIMENTS (EJECTION SEAT TRAINING TOWERS, SLEDS)**
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 132-135

Avail: NTIS HC A15/MF A01
The performance characteristics of the centifuge at CEV (Bretigny) are described as well as the protocol used. Results of studies at 6.5 G, 9 G, 11.5 G and 13.5 G are examined to indicate the types of injuries that occurred. Factors responsible for the low incidence of injuries on ejection seat training rigs and rocket sleds are mentioned. A.R.H.

**N82-29882#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**CLINICAL EXAMINATION OF SPINAL INJURIES**
P. Doury and G. Leguay *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 136-138

Avail: NTIS HC A15/MF A01
Manipulation of the subject in the erect, sitting, or lying position occurs following history taking and precedes radiology. In case of severe injury, clinical examination must always be cautious, usually with the patient lying on his back. In the upright position, the patient is examined from the front, back, and side as well as while walking on the toes and heels. Procedures for examining the seated, supine, and prone patient should be followed by neurological and gynecological examination. The identification of thoraco lumbar and cervical fractures is described. It is indicated that simple fractures of the spine are clinically silent in 15% to 20% of cases and that the most searching examination cannot provide sufficient evidence to eliminate with certainty the fracture of the spinal column. A.R.H.

**N82-29883#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**RADIOLOGY OF SPINAL TRAUMA IN AVIATION MEDICINE**
R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 139-186

Avail: NTIS HC A15/MF A01
Radiological examination of the spine in aerospace medicine is the same as that of any recent spinal trauma, and it obeys the same principles. The examination is carried out as soon as possible after an aviation accident. The entire spine is X-rayed segmentally, with frontal and lateral films. The examination consists of diagnostic radiography and complementary radiological assessment (localized and oblique views, tomography, dynamic films, examinations with the contrast media, scanning). S.L.

**N82-29884#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**ANALYTICAL STUDY OF TRAUMATIC LESIONS OF C3-C7**
*In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 187-198

Avail: NTIS HC A15/MF A01
In a frontal view in a neutral position, the spines are aligned, and the distances between them are more or less equal. Any deviation of the line of the spines is evidence of a unilateral dislocation, and increase in the distance between two spines always indicates a dislocation. In a straight lateral view, the articular processes are superimposed. If they appear are separated at a given level when they are superimposed below, a fracture of the articular processes is sought. The separation indicates a rotation. Traumatic lesions of the cervical spine are often unstable. This instability is not always evident on standard X-rays. It is sometimes necessary to carry out careful dynamic examinations on a second occasion. S.L.

**N82-29885#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**RADIOLOGICAL STUDY OF FRACTURES OF C1 AND C2**
*In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 199-210

Avail: NTIS HC A15/MF A01
Fractures of the axis and atlas of the C1 and C2 area represent 15 to 25% of the fractures of the cervical spine, and preferentially affect the odontoid. The angles from which the X-rays are taken must be strictly controlled. The frontal view can only be interpreted if the spinous process of C2 is projected on the center of the body atlas. In profile, in the normal state, the posterior border of the odontoid should lie on a straight line extended from that of the body. In contrast, the anterior border lies obliquely. The space between the anterior edge of the odontoid and the posterior border of the anterior arch of the atlas should not exceed 3 mm. The state of the soft tissues in front of the spine should always be carefully assessed. S.L.

**N82-29886#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**SEQUELAE OF VERTEBRAL FRACTURES AND TRAUMA**
R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 211-223

Avail: NTIS HC A15/MF A01
The broad principles of treatment of traumatic lesions and fractures of the spine in aviation medicine are the same as those in general practice. A general scheme in accordance with the different philosophies of various schools of orthopaedic surgery, is presented and the very common thoraco-lumbar fractures of the spine are contrasted with the more severe fractures of the cervical spine. S.L.

**N82-29887#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
**BACKACHE IN HELICOPTER PILOTS**
R. P. Delahaye, R. Auffret, P. J. Metges, J. L. Poirier, and B.

Vettes *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 225-260

Avail: NTIS HC A15/MF A01

Back pains in helicopter pilots are studied. These pains are usually caused by the vibrations of the helicopter. The picture is of a low grade, tiring, heavy ache localized in the lumber region, or sometimes lower. It extends laterally, often predominantly to one side, and may radiate to the buttocks, the iliac crests or, more rarely, the groin. This discomfort is brought on by flight, aggrevated by lifting effort of by long car journeys, and relieved by lying down and by physiotherapy. S.L.

**N82-29888#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**THE CERVICAL COLUMN OF PILOTS OF COMBAT AIRCRAFT**

R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 261-263

Avail: NTIS HC A15/MF A01

The pilots of high performance fighter aircraft sometimes complain of cervical pain during flight at low altitude. The level of vibrations is especially high and the pilot is often leaning forward in a fixed position. The character of the workload, notably in high performance combat aircraft (Mach 2) is considered in studying this problem. S.L.

**N82-29889#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**THE SPINE AND FITNESS FOR FLIGHT**

R. P. Delahaye, R. Auffret, G. Leguay, P. Doury, P. J. Metges, and C. Kleitz *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 264-289

Avail: NTIS HC A15/MF A01

The harmful effects of flight factors studied, and the analysis of different sets of statistics confirm that the vertebral column is subjected to a certain number of more or less severe stresses in the course of a flying career. It is necessary to define some criteria of fitness, as far as the spine is concerned, in relation to the type of aircraft. These conditions for fitness are considered from two very distinct aspects: fitness at the time of admission of flying personnel, and fitness upon reexamination and after air accidents. S.L.

**N82-29890#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**VERTEBRAL ARTHRITIS**

*In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 290-295

Avail: NTIS HC A15/MF A01

Vertebral arthritis is a commonly encountered disorder that rarely affects the fitness of flying personnel. Factors that are considered are the roles in which the flying duties impose a stress upon the spine; these mainly comprise helicopter and combat pilots. The painful functional disturbance unrelated to radiological signs, radiogically, severe involvement of the discs, and therapeutic considerations, which under favorable conditions do not exclude surgery are also emphasized. S.L.

**N82-29891#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**ANKYLOSING SPONDYLITIS**

*In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 296-300

Avail: NTIS HC A15/MF A01

The question of fitness of aircraft pilots in relation to the onset of ankylosing spondylitis is discussed. The clinical form of the disease and the nature of its course are considered. Factors emphasized are: specific roles, such as helicopters or combat aircraft, fixed rigidity of the spine and, even more, deformity, extraspinal involvement, severe inflammatory syndromes, the prospect of rapid development, the recognition of a specific aetiology, and the requirements of treatment. S.L.

**N82-29892#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**MEDICO-LEGAL ASPECT OF SPINAL DISORDERS IN AVIATION MEDICINE**

P. Doury, R. Auffret, and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med Feb. 1982 p 301-307

Avail: NTIS HC A15/MF A01

Medico-legal aspects of spinal disorders in aviation medicine are discussed. Trauma and intervertebral arthritis, trauma and inflammatory rheumatic conditions, and spondylolisthesis and its association with trauma are considered. S.L.

**N82-29893#** Instructional Science and Development, Inc., San Diego, Calif.

**POTENTIAL APPLICATIONS OF COMPUTER-ASSISTED INSTRUCTION TO P-3 AIRCREW TRAINING Final Report, Aug. 1979 - Feb. 1980**

Linda J. Mark, William W. Hawkins, and H. Dewey Kribs San Diego, Calif. Navy Personnel Research and Development Center Mar. 1982 43 p

(Contract N66001-79-C-0295)

(AD-A113491; NPRDC-SR-82-18; Rept-14-80-17) Avail: NTIS HC A03/MF A01 CSCL 09/2

An investigation was undertaken to examine the recently revised P-3 aircrew training syllabus at Patrol Squadron 31 to identify the potential contributions that could be made to training effectiveness by a shift to computer-assisted instruction (CAI). Five areas representing the range of potential applications were examined. The characteristics of existing and potential computer-based systems were reviewed, and recommendations for applications to P-3 aircrew training were made. Author (GRA)

**N82-29894#** Navy Personnel Research and Development Center, San Diego, Calif.

**INSTRUCTOR'S ROLE IN INDIVIDUALIZED TRAINING: A SURVEY OF TWO COMPUTER MANAGED COURSES Final Report, Jul. 1975 - Sep. 1978**

Kirk A. Johnson and Linda L. Graham May 1982 46 p

(ZF55522002)

(AD-A114917; NPRDC-TR-82-45; Rept-14-79-4) Avail: NTIS HC A03/MF A01 CSCL 05/9

Detailed records were made of instructor behavior in two Navy courses taught by means of individualized instruction. There were five specialized jobs in one course and six in the other. The jobs within each course differed considerably from one another in (1) the kinds and patterns of activities and (2) the total demands on the instructor. Most of the specialized jobs found in one course had nominal parallels in the other course, but the activities observed in these parallel jobs were frequently quite different. Author (GRA)

**N82-29895#** National Academy of Sciences - National Research Council, Washington, D. C. Div. of Health Sciences Policy.

**AIRLINE PILOT AGE, HEALTH, AND PERFORMANCE: SCIENTIFIC AND MEDICAL CONSIDERATIONS**

National Academy Press Jul. 1981 170 p refs

(Contract N01-AG-0-2112)

(PB82-161506; ISBN-0-309-03176-1; LC-81-82029) Avail: NTIS HC A08/MF A01 CSCL 05I

A comprehensive review is presented of current knowledge about biomedical and behavioral factors that might influence the ability of airline pilots to carry out their job safety as they advance in age. GRA

**N82-29896*#** Southwest Research Inst., San Antonio, Tex.

**A FUNCTIONAL VIDEO-BASED ANTHROPOMETRIC MEASURING SYSTEM Final Report**

J. H. Nixon and J. P. Cater 28 May 1982 78 p

(Contract NAS9-16158; SwRI Proj. 16-6141)

(NASA-CR-167637; NAS 1.26:167637) Avail: NTIS HC A05/MF A01 CSCL 06B

A high-speed anthropometric three dimensional measurement system using the Selcom Selspot motion tracking instrument for visual data acquisition is discussed. A three-dimensional scanning system was created which collects video, audio, and performance data on a single standard video cassette recorder. Recording rates of 1 megabit per second for periods of up to two hours are possible with the system design. A high-speed off-the-shelf motion analysis system for collecting optical information as used. The video recording adapter (VRA) is interfaced to the Selspot data acquisition system. Author

**N82-29897*#** California Univ., Berkeley. Dept. of Mechanical Engineering.

**AN APPROACH TO THE PRELIMINARY EVALUATION OF CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS) SCENARIOS AND CONTROL STRATEGIES**
J. D. Stahr, D. M. Auslander, R. C. Spear, and G. E. Young Jul. 1982 46 p refs
(Contract NCC2-67)
(NASA-CR-166368; NAS 1.26:166368) Avail: NTIS HC A03/MF A01 CSCL 06K

Life support systems for manned space missions are discussed. A scenario analysis method was proposed for the initial step of comparing possible partial or total recycle scenarios. The method is discussed in detail. R.J.F.

**N82-29898*#** Life Systems, Inc., Cleveland, Ohio.
**PREPROTOTYPE INDEPENDENT AIR REVITALIZATION SUBSYSTEM Final Report**
F. H. Schubert, Hallick, and R. R. Woods Apr. 1982 92 p refs
(Contract NAS9-15218)
(NASA-CR-167703; NAS 1.26:167703; LSI-TR-319-4) Avail: NTIS HC A05/MF A01 CSCL 06K

The performance and maturity of a preprototype, three-person capacity, automatically controlled and monitored, self-contained independent air revitalization subsystem were evaluated. The subsystem maintains the cabin partial pressure of oxygen at 22 kPa (3.2 psia) and that of carbon dioxide at 400 Pa (3 mm Hg) over a wide range of cabin air relative humidity conditions. Consumption of water vapor by the water vapor electrolysis module also provides partial humidity control of the cabin environment. During operation, the average carbon dioxide removal efficiency at baseline conditions remained constant throughout the test at 84%. The average electrochemical depolarized concentrator cell voltage at the end of the parametric/endurance test was 0.41 V, representing a very slowly decreasing average cell voltage. The average water vapor electrolysis cell voltage increased only at a rate of 20 mu/h from the initial level of 1.67 V to the final level of 1.69 V at conclusion of the testing. A.R.H.

**N82-29899*#** National Bureau of Standards, Washington, D.C. Industrial Systems Div.
**AN OVERVIEW OF EXPERT SYSTEMS**
William B. Gevarter May 1982 73 p Sponsored by NASA
(NASA-CR-169197; NAS 1.26:169197; NBSIR-82-2505) Avail: NTIS HC A04/MF A01 CSCL 05H

An expert system is defined and its basic structure is discussed. The knowledge base, the inference engine, and uses of expert systems are discussed. Architecture is considered, including choice of solution direction, reasoning in the presence of uncertainty, searching small and large search spaces, handling large search spaces by transforming them and by developing alternative or additional spaces, and dealing with time. Existing expert systems are reviewed. Tools for building such systems, construction, and knowledge acquisition and learning are discussed. Centers of research and funding sources are listed. The state-of-the-art, current problems, required research, and future trends are summarized. N.W.

**N82-29900*#** Air Force Flight Test Center, Edwards AFB, Calif.
**QUANTIFICATION OF PILOT WORKLOAD VIA INSTRUMENT SCAN**
J. R. Tole (MIT), A. T. Stephens (Worcester Polytechnic Inst.), R. L. Harris (Boeing Co., Renton, Wash.), and A. Ephrath (Bell Telephone Labs., Inc., Piscataway, N.Y.) 21 Jan. 1982 17 p refs Presented at and AIAA Workshop on Flight Testing to Identify Pilot Workload and Pilot Dyn., Edward AFB, Calif., 19-21 Jan. 1982
(Contracts NcC1-23; NcC1-56)
(NASA-CR-169238; NAS 1.26:169238) Avail: NTIS HC A02/MF A01 CSCL 05H

The use of visual scanning behavior as an indicator of pilot workload is described. The relationship between level of performance on a constant piloting task under simulated IFR conditions, the skill of the pilot the level of mental workload induced by an additional verbal task imposed on the basic control task, and visual scanning behavior is investigated. An increase in fixation dwell times, especially on the primary instrument with increased mental loading is indicated. Skilled subjects 'stared' less under increased loading than did novice pilots. Sequences of instrument fixations were also examined. The percentage occurrence of the subject's most used sequences decreased with increased task difficulty for novice subjects but not for highly skilled subjects. Entropy rate (bits/sec) of the sequence of fixations was also used to quantify the scan pattern. It consistently decreased for most subjects as the four loading levels used increased. S.L.

**N82-29901#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
**WORKSHOP ON THE DESIGN AND CONTROL OF DEXTEROUS HANDS**
John M. Hollerbach Apr. 1982 22 p refs Workshop held at Cambridge, Mass., 5-6 Nov. 1981
(Contract N00014-81-K-0494)
(AD-A114973; AI-M-661) Avail: NTIS HC A02/MF A01 CSCL 06/4

The workshop for the Design and Control of Dexterous Hands was held at the MIT Artificial Intelligence Laboratory on November 5-6, 1981. Outside experts were brought together to discuss four topics kinematics of hands, actuation and materials, touch sensing, and control. This report summarizes the discussions of the participants and attempts to identify a consensus on applications, mechanical design and control. Author (GRA)

**N82-29902#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Lab. of Human Factors.
**HUMAN/COMPUTER TRANSACTION TASKS: AN ANNOTATED BIBLIOGRAPHY**
John G. Casali May 1982 93 p
(Contract N00123-77-C-1081; ZF55521001)
(AD-A114800; NPRDC-TN-82-14; Rept-17-82-6) Avail: NTIS HC A05/MF A01 CSCL 09/2

An annotated bibliography of references relating to human/computer transactions is provided. Operator-analyst and software programmer roles are represented by the majority of the references. Topics covered include display formatting, error modeling, performance assessment, query languages, keyboard and data entry, data organization, and speech input/output. Author

**N82-29903#** Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
**CONTROL OF A DIRECT-DRIVE ARM**
Haruhiko Asada, Takeo Kanade, and Ichiro Takeyama 9 Mar. 1982 37 p refs
(Contract N00014-81-K-0503)
(AD-A114969; CMU-RI-TR-82-4) Avail: NTIS HC A03/MF A01 CSCL 13/9

A direct-drive arm is a new mechanical arm in which the shafts of articulated joints are directly coupled to the rotors of high performance torque motors. Since the arm does not contain any gears or transmission mechanisms between the motors and their loads, the drive systems have no backlash, small friction and high mechanical stiffness, all of which are desirable for fast, accurate and versatile robots. This paper presents the characteristic analysis and the design of the control system. GRA

**N82-30275#** Joint Publications Research Service, Arlington, Va.
**MEDICAL-BIOLOGICAL INVESTIGATIONS UNDER SPACE CONDITIONS: PRESENT AND FUTURE SIGNIFICANCE**
H. Fritze *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 22-24 Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 51-52

Avail: Issuing Activity

Weightlessness and cosmic radiation are discussed in terms of their medical and biological effect. Psychological factors are also considered. N.W.

**N82-30276#** Joint Publications Research Service, Arlington, Va.
**TWENTY YEARS OF MANNED SPACE FLIGHT FROM THE VIEWPOINT OF SPACE MEDICINE**
H. Haase *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 25-43 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 52-60

Avail: Issuing Activity

Preparation for the first manned space flight is reviewed. The flight itself is summarized from the point of view of space medicine. Women in space and extravehicular activity are also discussed. N.W.

**N82-30277#** Joint Publications Research Service, Arlington, Va.
**INITIAL AUDIOMETRIC INVESTIGATIONS IN AN ORBITAL STATION**
W. Proehl, R. Mocker, Ya. Yakovleva, I. I. Bryanov, and M. V. Nefedova *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jun. 1982 p 44-49 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2 Apr. 1981 p 60-62

Avail: Issuing Activity

Audiometric investigations were conducted for the first time in an orbital station. The filter audiometer and the precision sound impulse level measuring instrument, used during audiometric measurements in the station, are described and the audiograms of three measurements by both cosmonauts are described. No major deviations from the norm were found. Author

**N82-30278#** Joint Publications Research Service, Arlington, Va.
**INTRACUTANEOUS PARTIAL OXYGEN PRESSURE (pO2 SUB ic) IN MAN DURING SHORT-TERM SPACE FLIGHTS: RESULTS OF JOINT USSR-GDR SPACE FLIGHT**
H. Haase, E. A. Kovalenko, A. Vacek, M. P. Bobrovnitskiy, B. Jarsumbeck, and V. N. Sementsov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 50-57 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 63-65
Avail: Issuing Activity

The results of the Kislorod/Oxygen experiment are presented. The partial intracutaneous oxygen pressure (PIOP) was determined polarographically. The measurement probe used was an uncovered platinum puncture electrode. In the spaceship engineer, the PIOP during space flight had dropped by 19 mm Hg and local oxygen utilization had gone down by 4 mm Hg. During the hyperventilation test, during the first few days after the space flight, the spaceship commander only had a minor increase while the engineer and no increase in the PIOP. The results are preliminary. They agree well with the measurements on other spaceship crews. Author

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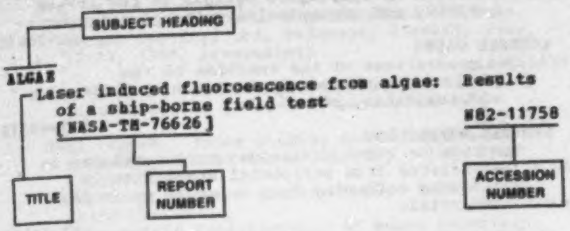

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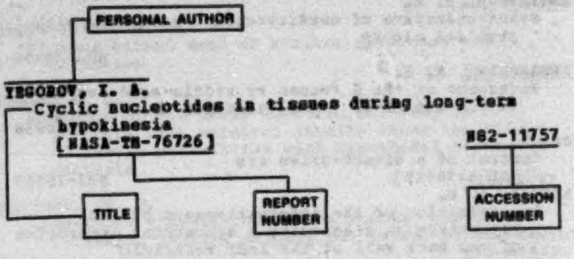

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 239)

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in November 1982 in**

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 318 reports, articles and other documents announced during November 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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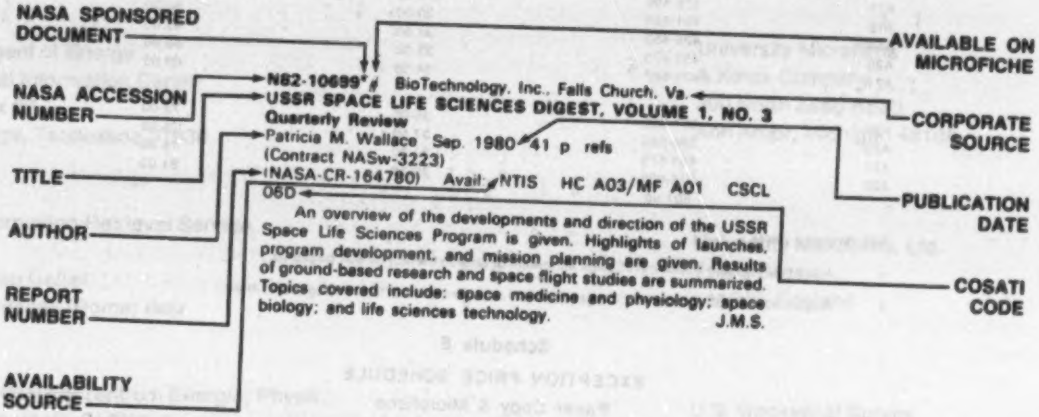
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N82-10699*# BioTechnology, Inc., Falls Church, Va.
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3 Quarterly Review**
Patricia M. Wallace Sep. 1980 41 p refs
(Contract NASw-3223)
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL 06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

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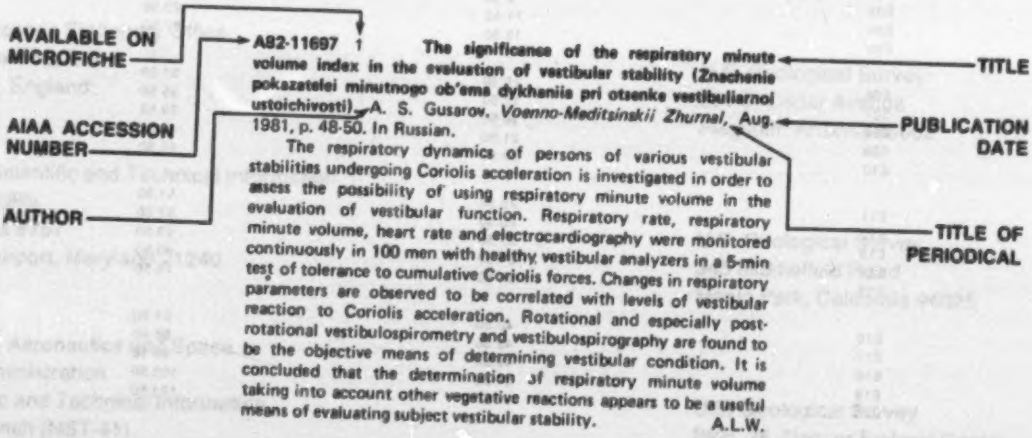
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A82-11697 # **The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniia pri otsenke vestibuliarnoi ustoichivosti).** A. S. Gusarov, *Voenno-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

# AEROSPACE MEDICINE AND BIOLOGY *A Continuing Bibliography (Suppl. 239)*

DECEMBER 1982

## IAA ENTRIES

**A82-41665** **Laboratory simulation of interstellar chemical evolution.** K. Kuriki and Y. Ishikawa (Tokyo, University, Tokyo, Japan). *Astrophysical Journal, Part 1*, vol. 259, Aug. 1, 1982, p. 411-422. 26 refs.

A plasma flow experiment has been carried out in the laboratory to simulate the chemical evolution in interstellar and circumstellar clouds. The gas constituents were identified at 7.2 cm downstream from the arc jet exit, and the streamwise distribution of the radiative emission of atomic ions was recorded by an optical multichannel analyzer. The final product in the gas phase was also analyzed with gas chromatography, and a similarity law was derived in order to connect the laboratory flow with the interstellar cloud or circumstellar flow. It was found that the ion-molecule reaction plays an important role in the recombination relaxation. The transition from equilibrium to nonequilibrium state was found in the flow, and some species were found to be localized and constructing spatial patterns in the flow. The relation to Miller's (1953) experiment is discussed. C.D

**A82-41681** **Color coding of information on electronic display devices (Über die Farbcodierung von Informationen auf elektronischen Sichtgeräten).** M. Häusing. Darmstadt, Technische Hochschule, Fachbereich Maschinenbau, Dr.-Ing. Dissertation, 1980. 190 p. 99 refs. In German.

The present investigation is concerned with the determination of colors which can be presented on electronic displays and which can be reproduced as elements of a code with respect to six linguistic categories. The six imaging categories are described by elementary color names of the colloquial language. The terms used are Red, Green, Blue, Yellow, Violet, and Turquoise. The effect of the geometric size of colored signs on the assignment of colors to the considered six nominal categories is investigated. Displays operating according to a television raster procedure are considered. Six color tolerance ranges are isolated, taking into account ranges within which the colors are uniformly classified by many observers with different experience levels as belonging to one of the six color categories. G.R.

**A82-41686** # **An on-line procedure for the extraction of acoustically evoked potentials from the electroencephalogram (Ein on-line Verfahren zur Extraktion von akustisch evozierten Potentialen aus dem Elektroenzephalogramm).** J. Klotti. Karlsruhe, Universität, Fakultät für Elektrotechnik, Dr.-Ing. Dissertation, 1980. 178 p. 40 refs. In German.

Audiometry is concerned with the determination of the hearing ability of a human being. An objective audiometry method is based on the evaluation of the electroencephalogram (EEG). EEG audiometry is also called Electric Response Audiometry (ERA). The employment of ERA involves a utilization of the behavior of the brain to produce specific bioelectric responses in case of an arrival or peripheral stimuli of tactile, optical, or acoustic characteristics. These bioelectric responses are called evoked potentials. The foundations of objective audiometry are discussed along with the currently employed methods of this approach. A description is presented of a new procedure which makes it possible to eliminate the disturbing factors which are mainly observed in connection with the derivation of evoked potentials. The new procedure is based on a utilization of the averaging method. Attention is given to results obtained with the considered method and the realization of an ERA computer. G.R.

**A82-41690** # **A command and control device for a man-machine system - Fabrication of a platform and trials (Dispositif de contrôle et de commande d'un systéme homme-machine - Réalisation d'une plate-forme et essais).** P. Mangin. Valenciennes et Hainaut-Cambrésis, Université, Docteur (3e cycle) Thesis, 1980. 131 p. 56 refs. In French.

The parameters, mechanics, construction, operation, and performance of a motion simulator suitable for testing pilot visual functions and task performance while undergoing dynamic movements are reported. An electrohydraulic actuator system was chosen after an analysis of existing machinery and consideration of the inclusion of three axes of rotation into the system. The human subject sits in the center of a platform and is exposed to visual stimuli while the chair moves on three axes, and certain tasks must be performed. Subjects were initially exposed to pitching motions of varying durations. Reaction time to the appearance of visual cues and subsequent task performance were measured and statistical analyses are presented. The chair, with movements proceeding along preprogrammed lines, is concluded to be effective for modification of tasks requiring visual stimuli, and also determining the range, amplitude, and frequency of vestibular disturbances transmitted to the pilot by motions. M.S.K.

**A82-41908** **An analog tracking filter for a swept-sine human vibration test.** M. S. Hundal and B. B. Woodworth (Vermont, University, Burlington, VT). In: International Instrumentation Symposium, 27th, Indianapolis, IN, April 27-30, 1981, Proceedings. Part 2. Research Triangle Park, NC, Instrument Society of America, 1981, p. 515-520. PHS-sponsored research.

The theory, design and construction of a tracking filter are presented. The filter is used for the accelerometer signals from a swept-sine human vibration test. Without the filter the signals contained high harmonic content which rendered the determination of frequency response difficult and error prone. The filter is based on a second order low pass circuit consisting of two integrators, a summer and a sign inverter. The frequency of the filter is continuously varied to keep it tuned to the driving frequency. The frequency variation is obtained by inserting a multiplier at the input of each integrator; the former are supplied by a ramp voltage proportional to the frequency. (Author)

**A82-42065** † **Principles of biological and medical climatology (Osnovy meditsinskoi i biologicheskoi klimatologii).** N. M. Voronin. Moscow, Izdatel'stvo Meditsina, 1981. 352 p. 200 refs. In Russian.

The effect on the body of weather, climate, and season is considered, together with the effect of diurnal changes in weather. The theoretical assumptions are expounded, and the way in which natural factors can be used in the prevention and cure of disease is discussed. Attention is also given to the way in which deleterious environmental factors can be neutralized. C.R.

**A82-42078** # **An investigation of the mechanical meaning of the surface electromyogram (Contribution à l'étude de la signification mecanique de l'électromyogramme de surface).** M. Boulangé. Lille I, Université, Docteur (3e cycle) Thesis, 1980. 175 p. 126 refs. In French.

The relation between the force developed by a muscle during voluntary contractions and its electromyographic activity is investigated by experiments conducted on rat gastrocnemius muscles. The muscle is activated by nerve stimulation and the electromyogram (EMG) is detected by means of surface electrodes. The relation between the EMG and the force developed at the time of the tetanic contractions simulates the spatial and temporal recruitment of the motor units. The interpretation of the EMG-force relation is completed by analyzing the histological profiles of the two heads of the muscle and studying the potentials collected in the course of the muscular contractions. Results show that the diameter of the same type of fibers varies according to the regrouping and to the location of the fibers in the muscle. The spatial recruitment of the motor units is clearly evident at the time of voluntary contractions. The influence of the stimulation frequency is more complex than the temporal recruitment at the time of voluntary movement. Finally, the EMG-force relation is found to be curvilinear, with at first a small slope, reflecting the activity of the slow motor units, but then it becomes steeper due to the activity of both the slow and rapid motor units. N.B.

**A82-42080** # **An examination of heat exchanges in man - Establishment of a reference technique for measuring average cutaneous temperatures using infrared thermometry (Contribution à l'étude des**

**échanges thermiques chez l'homme - Détermination d'une méthode de référence pour la mesure des températures cutanées moyennes par thermométrie infra-rouge).** J.-L. Lecroart. Lille I, Université, Docteur (3e cycle) Thesis, 1980. 102 p. 41 refs. In French.

The development of a method for establishing the average cutaneous temperature in a nonempirical manner using IR thermometry is reported. A numerical model of heat exchanges between the skin and the ambient environment is presented and classical formules for calculating the average cutaneous temperature are reviewed, showing that recorded discrepancies from test to test are due to arbitrary choices of locations for the placement of thermocouples. IR thermometric scans of the whole body are demonstrated to yield maps of the electromagnetic radiation emitted by the body through the skin, with different temperatures expressed as different gray levels. The scan is performed without touching the person, and techniques for accounting for the intervening medium and the angle of view are explored. Specific points of temperature are found by weighting the scanned temperature with a coefficient representing the total area of the measurement around that site. M.S.K.

**A82-42083** # **The effects of the direction of attention on the transmission of cutaneous information (Effets de la direction de l'attention sur la transmission des messages cutanés).** J. Honore. Lille I, Université, Docteur (3e cycle) Thesis, 1980. 99 p. 86 refs. In French.

An experimental investigation of the modulation of cutaneous excitation impulses during performance of a task requiring a particular bodily orientation and attention focus are presented. Subjects (right-handed only) were exposed to electrical current stimulation at internal popliteal or the external malleolar region. The afferent pulses were applied at 330 Hz, with variations in intensity and duration. The intensity of the stimuli was expressed as a function of the psychophysiological standard of unity, which marks the response threshold. The subjects were then tested during two tasks while intermittent stimulation continued: moving dots on a display screen to the same level or fixating on a target area dot on the screen while the head was held in a steady position. Subjects were asked to count the number of stimuli they received during the trial period. It was found that the stimuli were detected better when the attention was directed toward the same side of the visual field as the side of the body which was stimulated. The results confirm that orientation of the optical attention is important even when stimuli occur which do not require visual attention. M.S.K.

**A82-42087** # **Thermography and microwave heating - The design and fabrication of systems intended for biological and medical use (Thermographie et chauffage microonde - Contribution à la conception et à la réalisation de systèmes destinés au génie biologique et médical).** D. D. Nyguen. Lille I, Université, Docteur (3e cycle) Thesis, 1980. 137 p. 65 refs. In French. Research supported by the Délégation Générale à la Recherche Scientifique et Technique and Caisse Nationale de l'Assurance des Travailleurs Salariés.

Applications of thermographic sensors for measuring subdermal heat fluxes and as control sensors in the use of microwaves for hyperthermic cancer treatment are described. The development of a monomode rectangular waveguide for measuring nontraumatic subcutaneous temperature of living tissues is modeled numerically. Optimization is defined to mimimize the reflection coefficient at the skin-sensor interface and maximize the coupling between the waveguide and the coaxial connector. It is shown that, in the 1-10 GHz range, a weak microwave signal caused by warmth can pass through thick layers of adipose tissue or bone, and up to 1.5 cm through high water content tissue, such as muscles. The fabrication of a microwave sensor operating at 2-4 GHz as a tumor detector through observation of temperature gradients which indicate the presence of a cancerous mass is reported. Techniques for heating the tumors to destroy them, while simultaneously monitoring to assure that interior temperatures do not exceed 43 C are detailed. M.S.K.

**A82-42090** # **An analysis and modeling of the binocular system in human sagittal vision (Analyse et modélisation du système binoculaire en vision sagittale chez l'homme).** J. L. Edme. Lille I, Université and Valenciennes et Hainaut-Cambrésis, Université, Docteur (3e cycle) Thesis, 1980. 182 p. 43 refs. In French.

An analysis of ocular movements in humans is presented and a model for binocular vergence is developed. An experimental device for tracking the positions of the eyes following a moving object is described, noting the confinement of the stimuli to the sagittal plane of vision. An oculometer was devised which recorded the eye motions, with the signal being analyzed by a computer as to the changing angles of the position of the eyes, which were focused on a target being maneuvered on a screen. A total of 17 subjects were exposed to trials which required vergence of the eyes at angles of 4.5, 7, 9.5, and 12 deg. Curves of amplitude and dephasing were generated of the oculomotor response to a sinusoidal stimulus. Vergence was found to be particularly important to the functioning of saccadic eye movements. A frequency of visual cut-off was found to exist, at which movement could not be tracked. The binocular system was modeled as a coupled system, linked in positioning and behaving nonlinearly. M.S.K.

**A82-42171** † **Current problems in hypobiosis (Aktual'nye voprosy gipobioza).** N. N. Timofeev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 39-48. 57 refs. In Russian.

A review of recent research concerning hypobiosis, the slowing down of the life processes of warm-blooded animals and humans over an extended period of time, is presented. It is concluded in a summary of research concerning attempts to produce an analog of natural hypobiosis by prolonged hypothermia that the use of traditional pharmacological substances, such as narcotics and neuroplegic mixtures, is unlikely to produce an acceptable artificial hypobiosis in the foreseeable future. A better approach is suggested to lie in the search for substances which alter the neurohumoral regulation of warm-blooded animals in ways similar to the changes in these processes shown in animals during hibernation. Results of recent research concerning the biological mechanism of hypobiosis show the neurochemical basis of the processes of chemical thermoregulation. The fundamental link in this mechanism is found to be the role of the catecholamine system. N.B.

**A82-42172** † **Changes in the transaminase activity and several biochemical blood values in the acute period of experimental myocardial infarction in monkeys (Izmeneniia transaminaznoi aktivnosti i nekotorykh biokhimicheskikh pokazatelei krovi v ostrom periode eksperimental'nogo infarkta miokarda u obez'ian).** N. I. Lemondzhava and G. S. Belkaniia (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 53-56. 11 refs. In Russian.

**A82-42173** † **The dynamics of the development of postischemial cerebrovascular phenomena during the perfusion of the cerebral vessels with a stable volume of blood (Dinamika razvitiia postishemicheskikh tserebrovaskuliarnykh fenomenov v usloviiakh perfuzii mozgovykh sosudov stabil'nym ob'emom krovi).** M. D. Gaevyi, Zh. V. Sankina, Ch. K. Tkhak, and T. V. Sankina (Piatigorskii Farmatsevticheskii Institut, Piatigorsk, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 61-64. 13 refs. In Russian.

**A82-42174** † **The influence of prostaglandins and polyunsaturated fatty acids on the corticosteroid metabolism of normal and spontaneously hypertensive rats (Vliianie prostaglandinov i polinenasyshchennykh zhirnykh kislot na metabolizm kortikosteroidov u normotenzivnykh i spontanno gipertenzivnykh krys).** A. G. Kucherenko and Kh. M. Markov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 69-72. 19 refs. In Russian.

**A82-42175** † **The interrelationship of the function of the blood kallikrein-kinin system with the main parameters of central hemodynamics during hypertension (Vzaimosviaz' funktsional'nogo sostoianiia kallikrein-kininovoi sistemy krovi s osnovnymi parametrami tsentral'noi gemodinamiki pri gipertonicheskoi bolezni).** V. V. Karpitskii (Ialtinskii Nauchno-Issledovatel'skii Institut Fizicheskikh Metodov Lecheniia i Meditsinskoi Klimatologii, Yalta, Ukrainian, SSR.) *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 86-89. 11 refs. In Russian.

**A82-42196** **Logistics support productivity improvement.** R. A. Boenning, G. A. Mohr, Jr., and V. B. Minnis, Jr. (Westinghouse Electric Corp., Baltimore, MD). In: Annual Reliability and Maintainability Symposium, Los Angeles, CA, January 26-28, 1982, Proceedings. New York, Institute of Electrical and Electronics Engineers, 1982, p. 227-232.

Five current research and development projects in Westinghouse Integrated Logistics Support Division which contribute to improved productivity and enhanced quality in logistics support are described. The projects range widely over the field of logistics support. Combined interactive training, technical manuals and ATE; voice control of ATE; automated conversion of photographs to line drawings; a compact laser range simulator; and computerized reading grade level determination are discussed. (Author)

**A82-42230** **Training and personnel impact on increased productivity.** C. H. Duffee (Martin Marietta Aerospace, Orlando, FL). In: Annual Reliability and Maintainability Symposium, Los Angeles, CA, January 26-28, 1982, Proceedings. New York, Institute of Electrical and Electronics Engineers, 1982, p. 497-503. 11 refs.

Test data are presented from an evaluation of the impact of novel training methods on operation and maintenance personnel performance. Extension Training Material (ETM) lessons allowed the test group to overcome the experience advantage of a control group, and then outperform the control group in every criterion measured. A 31% reduction in performance time and a 59% error reduction is reported. The ETM lessons are multimedia, programmed instructional training materials which include audiovisual, highly illustrated print, and audio tape components. Media selection for each lesson is based on audience learning skill as well as task characteristics. Learning retention is enhanced as a result of the integration of more of the user's five senses into the learning process. O.C.

**A82-42600** † **Activation of lipid peroxidation during stress in man, evaluated according to the content of pentane in expired air (Aktivatsiia perekisnogo okisleniia lipidov pri stresse u cheloveka, otsenivaemaia po soderzhaniiu pentana v vydykhaemom vozdukhe).** L. L. Prilipko, O. N. Orlov, S. M. Ivanova, B. E. Kagan, F. Z. Meerson, and A. S. Ushakov (Akademiia Meditsinskikh Nauk SSSR; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 265, no. 4, 1982, p. 1010-1013. 14 refs. In Russian.

**A82-42601** † **Features and variations of the local hematocrit (Osobennosti i izmeneniia mestnogo gematokrita).** G. I. Mchedlishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 87-95. 30 refs. In Russian.

Studies of the local variation in the hematocrit, the volume percentage of erythrocytes in the whole plasma, are reviewed, and methods for both direct and indirect determination of the local hematocrit are discussed. It is concluded that two related phenomena contribute to the observed local variation in the hematocrit. First, a relative decrease can occur in the number of erythrocytes in the microvessels as compared to those present in the central circulatory system. Second, variation in the local hematocrit can occur according to the rate of local circulation, which is associated with the nonuniform distribution of erythrocytes and plasma in the sequence of arterial branches beginning with the aorta. Also presented is a discussion of the possible physiologic and pathologic implications of the local variations in the hematocrit. N.B.

**A82-42602** † **New methodological aspects of the investigation of organ specificity of the lymphatic pathways (Novye metodicheskie aspekty izucheniia organnoi spetsifichnosti limfonosnykh putei).** Iu. E. Vyrenkov and E. L. Soboleva (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 84-87. 17 refs. In Russian.

Replicas of the lymphatic pathways of the microvascular beds of various organs of humans, dogs, and rats are studied by scanning electron microscopy. The results provide for the three dimensional visualization of the lymphatic microvessels, both capillaries and post-capillary segments, in various organs, such as the heart, liver, kidney, and lungs, and demonstrate their considerable structural diversity. The organ specificity of the lymphatic microcirculatory bed is examined. In addition, it is suggested that the terminology used to designate various segments of the lymphatic pathway be clarified and standardized. N.B.

**A82-42603** † **The contraction, regulation, and functional role of lymph vessels (Sokrashcheniia limfaticheskikh sosudov, ikh reguliatsiia i funktsional'naia rol').** R. S. Orlov and R. P. Borisova (Leningradskii Sanitarno-Gigenicheskii Meditsinskii Institut, Leningrad, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 74-83. 11 refs. In Russian.

The contractile activity of isolated segments of the main lymph vessels, as expressed in spontaneous phasic rhythmic contractions, slow waves, and variations in tone, is studied in rats, guinea pigs, and sheep. Results show that the contraction produced by myocytes in response to stimulation of various intensities is found to be of the quantal type, depends on the stretching force, and also shows various forms of rhythmointropic dependence. The pacemaker of a section of a lymph vessel between valves optimizes the rhythm and amplitude of the contraction according to the temperature and ionic composition of the medium, intravascular pressure, etc. In addition, the sections of the major lymph vessels between valves possess both inhibitory and excitatory nerves. It is concluded that the combination of phasic and tonic myocytes allows the lymph vessels to function like the heart and blood vessels, which enables them to cope with both the pumping of the lymph and variations in the capacity of their own vessels. N.B.

**A82-42604** † **Circulation and energetics of forearm muscles in man (Krovoobrashchenie i energetika myshts predplech'ia cheloveka).** Ia. V. Skards, A. O. Paeglitis, and D. R. Matisone (Latviiskii Nauchno-Issledovatel'skii Institut Kardiologii, Riga, Latvian SSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 65-74. 20 refs. In Russian.

Mechanisms are examined whereby a long-term equilibrium can be achieved between the rates of ATP metabolism and aerobic resynthesis of phosphogens during voluntary contraction of forearm muscles in static conditions. It is shown that such an equilibrium can be achieved only if the entire additional blood flow is directed toward those muscle fibers which are active at a given moment. An increase in the relative force of contraction, a reduction in regional arterial blood pressure, or a decrease in the oxidative phosphorylation efficiency will lead to a cumulative activation of aerobic phosphogen resynthesis, inhibition of mechanisms responsible for blood flow redistribution, hemodynamic and metabolic shunting of active muscle fibers, and an abrupt decrease in working capacity. V.L.

**A82-42605** † **The coronary vessels and the contractile apparatus of the myocardium in immune heart damage /Histochemical and ultrastructural studies/ (Koronarnye sosudy i sokratitel'nyi apparat miokarda pri immunnom povrezhdenii serdtsa /Gistokhimicheskie i ul'trastrukturnye issledovaniia/).** A. A. Moibenko and L. F. Popovich (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 58-64. 52 refs. In Russian.

**A82-42606** † **Analysis of load characteristics and development of new indicators of cardiac function (Analiz nagruzochnykh kharakteristik i razrabotka novykh pokazatelei funktsional'nogo sostoianiia serdtsa).** Ts. R. Orlova, M. P. Sakharov, S. E. Ragimov, V. A. Shlain, and A. V. Trubetskoi (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 48-58. 27 refs. In Russian.

The load characteristics of the heart have been investigated using a mathematical model and experimental data on intact cat hearts. It is found that the loading characteristics, represented as a relationship between the peak values of intraventricular pressure and blood flow in the aorta, are close to linear and can be described by two parameters: the force parameter (maximum pressure at zero blood flow) and the rate parameter (maximum blood flow at zero pressure). The load characteristics are largely determined by the viscoelastic properties of the left ventricle. The possibility of using these parameters as indicators of cardiac function is discussed. V.L.

**A82-42607** † **The effectiveness of neurohumoral influences on pulmonary circulation (Effektivnost' neirogumoral'nykh vliianii na legochnoe krovoobrashchenie).** D. P. Dvoretskii and B. I. Tkachenko (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 39-48. 46 refs. In Russian.

Changes in the resistance and capacity of pulmonary vessels in response to the activation of sympathetic and parasympathetic pulmonary nerves and to introduction of acetylcholine, serotonin, and histamine into the pulmonary circulation system were studied in cats and rabbits. Results indicate that vasomotor activity in the lungs has a relatively weak effect on integral lung circulation indicators, while neurohumoral control of regional blood flow distribution in the lungs is fairly effective. These findings are explained in terms of local and regional differentiation of the biophysical properties of lung tissue and gravitational influences on the distribution pattern of blood flow in the lungs. Acetylcholine, serotonin, and histamine are shown to increase the postcapillary resistance of the pulmonary vascular bed to a greater extent than they increase the precapillary resistance. V.L.

**A82-42608** † **Emotional stress and hypokinesia in the origination of cardiac disorders and hypertensive states (Emotsional'noe napriazhenie i gipokineziia v geneze narushenii serdechnoi deiatel'nosti i gipertenzivnykh sostoianii).** B. M. Fedorov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 33-39. 27 refs. In Russian.

A biotelemetric monitoring system has been used to study the cardiac activity of man under emotional stress and various degrees of motor activity in both simulated and real-life situations. The results of the study indicate that prolonged hypokinesia increases the susceptibility of man to stress reactions, leads to excessive stimulation of the circulatory system, and inhibits depressor reflexes, which can produce a prolonged increase in arterial blood pressure. Normalization of circulation on termination of emotional stress is delayed under the conditions of hypokinesia. V.L.

**A82-42609** † **Blood circulation and aging (Krovoobrashchenie i starenie).** V. V. Frol'kis (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 24-33. 30 refs. In Russian.

It is noted that the changes brought about in the heart and blood vessels by aging pave the way for cardiovascular pathologies, among them atherosclerosis, arterial hypertension, ischemic diseases of the heart, and cardiac insufficiency. Attention is given to hemodynamics and the contractility of the heart, to efferent neurohumoral regulation of the cardiovascular system, and to the regulation of coronary circulation in old age. It is found that the hemodynamic center becomes excitable, that neural adrenergic and cholinergic influences become weaker, and that shifts occur in the sensitivity of the heart and blood vessels to humoral factors. Taken as a whole, these changes are seen as hampering the adaptability of the circulatory system. C.R.

**A82-42610** † **A systems analysis of individual vascular reactions in animals under experimentally induced emotional stress (Sistemnyi analiz individual'nykh sosudistykh reaktsii zhivotnykh v usloviiakh eksperimental'nogo emotsional'nogo stressa).** K. V. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 11-24. 18 refs. In Russian.

On the basis of the theory of functional systems propounded by Anokhin

(1970), an approach that allows for individual responses to emotional stress is discussed. Data are presented on the individual vascular reactions of animals faced with the same type of threatening situation. It is shown that both in animals resistant to changes in blood pressure under emotional stress and in those predisposed to such changes, the distribution of catecholamines in the brain differs from individual to individual. It is also shown that, in animals exhibiting differing degrees of resistance to emotional stress, the morphological and histochemical changes in the ganglia of the involuntary system are peculiar to each individual. C.R.

**A82-42611 † Biomicroscopy of a microcirculatory bed in experiments - Possibilities, limitations, and prospects (Biomikroskopiia mikrotsirkuliarnogo rusla v eksperimente - Vozmozhnosti ogranicheniia, perspektivy).** A. M. Chernukh (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 7, 1982, p. 3-11. 13 refs. In Russian.

The experience gained in studying microcirculation in various organs underlines the importance of taking into consideration the microcirculatory bed, along with the nearby cell formations. Using contact luminescent biomicroscopy in investigations of permeability, data are obtained on the gradient of vascular permeability and on the role of venular and lymphatic microvessels in regulating tissue homeostasis. The homeostasis is regulated at the level of the functional element of an organ where the ultrafine structure of the microvessel wall is not uniform. It is noted that further improvements in biomicroscopy have come from the use of the television microscope and from analyses of the television images. Biomicroscopic studies are found to yield fuller results when the tissue is afterwards subjected to a morphological study. Techniques of high-speed microcinematography and lasers are seen as promising. C.R.

**A82-42612 † Experimental study of the combined effect of noise and acetone (Eksperimental'noe izuchenie kombinirovannogo deistviia shuma i atsetona).** L. N. Burykina, V. L. Ponomareva, V. P. Kurnaeva, A. P. Red'kin, E. V. Shmeleva, E. V. Varsanovich, A. D. Dasaeva, and N. K. Demokidova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 48-51. 11 refs. In Russian.

The combined effect of noise and acetone was studied in male Wistar rats. Rats that were exposed to the separate effects of acetone at low but active levels and noise at a level of 85 dB in the course of one month and a half were found to exhibit single-type nonspecific changes primarily in the neuroendocrine system. The combined effect of acetone and noise was found to be less than additive for all of the physiological indices studied, and close to antagonistic for some of these indices. B.J.

**A82-42613 † The state of hemodynamics under the effect of laser radiation (Sostoianie gemodinamiki pri deistvii lazernogo izlucheniia).** I. N. Ushkova, L. A. Pokrovskaia, and I. M. Suvorov (Akademiia Meditsinskikh Nauk SSSR, Leningrad). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 44, 45. In Russian.

Experiments were conducted to evaluate the state of systemic blood circulation in operators of He-Ne lasers. Mechanocardiography showed that operators of He-Ne lasers with output powers of 2-8 mW exhibited lower-than-normal levels of arterial pressure combined with lower-than-normal values of blood minute volume and insufficient increases of peripheral resistance, or combined with constant blood minute volume and decreased peripheral resistance. Laser radiation tends to produce hypotension, accompanied by a reduction in blood minute volume at a constant peripheral resistance. B.J.

**A82-42614 † The condition of the cardiovascular system in air traffic controllers according to data acquired at the workplace (Sostoianie serdechno-sosudistoi sistemy u aviatsionnykh dispetcherov po dannym obsledovaniia na rabochem meste).** Sh. T. Avetikian and E. L. Kan (Nauchno-Issledovatel'skii Neirokhirurgicheskii Institut, Leningrad, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 40, 41. In Russian.

**A82-42615 † The effect of general vibration combined with intermittent noise on the human auditory function (Deistvie obshchei vibratsii v sochetanii s preryvistym shumom na slukhovuiu funktsiiu cheloveka).** N. T. Svistunov and L. N. Marchenkova. *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 35, 36. 5 refs. In Russian.

**A82-42616 † Early clinical manifestations of vibration-noise pathology in miners of Donets Basin (O rannikh klinicheskikh proiavleniiakh vibratsionno-shumovoi patologii u gornorabochikh Donbassa).** M. L. Vel'skaia, M. A. Nekhorosheva, G. I. Grishanova, N. G. Simonian, A. M. Marin, E. A. Smirnova, and V. I. Dzhereiei (Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukranian SSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 19-21. In Russian.

**A82-42617 † A physiological justification of allowable noise levels in work involving heavy physical labor under nervous stress (Fiziologicheskoe obosnovanie dopustimykh urovnei shuma pri tiazhelom fizicheskom nervno-napriazhennom trude).** G. S. Zvereva, M. V. Ratner, A. V. Kolganov, and L. V. Mar'enko (Institut Gigieny Truda i Profzabolevanii, Donetsk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 7-11. In Russian.

It is found that, as reflected by physiological indicators, heavy physical labor, noise, and nervous stress conditions act synergistically. The effect of noise in bringing about additional shifts in the physiological indicators is found to be more pronounced than that of physical labor or nervous stress. C.R.

**A82-42618 † Levels of physiological reserves of sailors working a 10-hour shift (Urovni fiziologicheskikh rezervov organizma moriakov, rabotaiushchikh po 10-chasovomu grafiku).** V. N. Evstaf'ev, L. M. Shafran, and O. Iu. Netudykhatka (Institut Gigieny Vodnogo Transporta, Odessa, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 4-7. 10 refs. In Russian.

**A82-42619 † Studies directed toward improving hygienic standards pertaining to total-body vibration resulting from heavy moving equipment (Materialy k utochneniiu gigienicheskikh norm obshchei transportno-tekhnologicheskoi vibratsii).** Iu. P. Pal'tsev, Iu. P. Syromiatnikov, A. M. Vialov, E. M. Abramova, T. A. Shabolina, and E. L. Sineva (Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia*, July 1982, p. 1-4. In Russian.

Tests were conducted on excavator operators in order to define safe levels of total-body vibration for operators of heavy moving equipment. Simulation experiments revealed the adverse effect of low-frequency vibration (108 dB in the octave band with a geometric mean frequency of 4 Hz) on the total and regional cerebral hemodynamics. It is concluded that safe working conditions can be attained if vibration levels at workplaces do not exceed values corresponding to LS (limiting spectrum) 92. B.J.

**A82-42620 † Principles of the definition and classification of tissues (Printsipy opredeleniia i klassifikatsii tkanei).** A. A. Bazitov (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 92-100. 30 refs. In Russian.

A number of questions pertaining to the definition and classification of tissues are addressed, including difficulties in defining the concept of tissue, general principles underlying the classification of tissues, the relationship between criteria of definition and classification, and the place that the term 'tissue' occupies among other biological terms. It is suggested that contemporary histological description is based on two classifications of tissues, which are complementary: morphophysiological and genetic. B.J.

**A82-42621 † The organization of the afferent subcortical inputs of the visual region of the cat cerebrum (Organizatsiia afferentnykh podkorkovykh vkhodov zritel'noi oblasti kory bol'shogo mozga u koshki).** G. P. Obukhova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 17-21. 15 refs. In Russian.

**A82-42622 † Stereological analysis of interneuronal contacts in the cerebral cortex of rats during the posthypoxic period (Stereologicheskii analiz mezhneironal'nykh kontaktov kory bol'shogo mozga krys v postgipoksicheskom periode).** S. S. Stepanov, V. V. Semchenko, and Iu. V. Chesnokov (Omskii Meditsinskii Institut, Omsk, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 12-16. 16 refs. In Russian.

The effect of hypoxia on the ultrastructure and number of synapses in the neocortex of white rats was studied by the selective staining of the interneuronal contacts. Asphyxia lasting 6 min results in a considerable decrease in the number of synapses. Reparation during the posthypoxic period occurs at the cost of hypertrophy of the contacts and the activation of neosynapsogenesis. The considerable decrease in the number of synapses (by 31%) was maintained one month after the asphyxia, with a considerable change in the synapsoarchitectonics. B.J.

**A82-42623 † Changes in the lymphoid organs of rats under the effect of acute hypoxia (Izmeneniia v limfoidnykh organakh u krys pri ostroi gipoksii).** A. M. Nalivaiko (Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 87-91. 21 refs. In Russian.

Changes in the thymus, spleen, and mesenteric lymph nodes in rats under acute hypoxia that simulates the effect of elevations of 7000 m above sea level for 1 hour and 6500 m above sea level for 6 hours are investigated using histological and cytofluorometric methods. The migration of differentiated lymphocytes out of the lymphoid organs is found to increase, with essential shifts occurring in the temporal parameters in the mitotic cycle of the lymphocytes. The contents of nucleic acids in the lymphoid cells is found to change. The hypoxia is thus seen as intensifying differentiation processes. C.R.

**A82-42624 † The anatomy and topography of the human bronchopulmonary lymph nodes (Anatomiia i topografiia bronkholegochnykh limfati-**

**cheskikh uzlov u cheloveka).** A. B. Aubakirov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 64-67. 11 refs. In Russian.

**A82-42625** † **The topography of elements of the cardiac conduction system (Topografiia elementov provodiashchei sistemy serdtsa cheloveka).** S. S. Mikhailov and A. V. Churbar (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 56-67. 25 refs. In Russian.

A total of 112 heart preparations from persons ranging in age from 18 to 87 is studied. A number of fasciculi connected with the sinoatrial and atrioventricular nodes are revealed. The atrioventricular part of the conduction system is seen as having a structure and topography that is not subject to variation. The sinoatrial part, being younger in a phylogenetic sense, is more susceptible to variation. C.R.

**A82-42626** † **Microcirculatory state in the case of chronic obliteration of arteries (Sostoianie mikrotsirkuliatornogo rusla pri khronicheskoi obliteratsii arterii).** P. F. Bytka, V. T. Zhitsa, and E. T. Chikale (Klinika Gospital'noi Khirurgii; Kishinevskii Meditsinskii Institut, Kishinev, Moldavian SSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 49-55. 13 refs. In Russian.

**A82-42627** † **A morphological investigation of the regulatory mechanisms of the intracerebral blood circulation (Morfologicheskie issledovaniia reguliatornykh mekhanizmov vnutrimozgovogo krovoobrashcheniia).** P. A. Motavkin, V. M. Chertok, and Iu. I. Pigolkin (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 82, June 1982, p. 42-49. 35 refs. In Russian.

The intracerebral branches of the posterior and medial cerebral arteries in the region of the gray and white substances of the parietal, occipital, and temporal cerebral lobes, and in the nuclei of the superior and inferior colliculi in the tectum mesencephali, as well as in the pons, were studied in 36 male corpses (from 5-49 years of age) by the methods of Cajal, Koelle, Furness, and Costa. Results show the presence of sensory nerve endings of the cholinergic plexuses in the walls of the intracerebral arteries with a diameter of up to 100 microns and greater, and adrenergic neural networks in arteries up to 40 microns in size and larger. It is suggested that the nerve and other systems of the intracerebral circulatory bed play a role in the regulation of the local cerebral circulation. N.B.

**A82-42628** † **Characteristics of pharmacotherapeutic complications in otolaryngology /Review of the literature/ (Osobennosti oslozhnenii farmakoterapii v otolaringologii /Obzor literatury/).** I. S. Chekman (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) and R. A. Abyzov (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, May-June 1982, p. 79-82. 25 refs. In Russian.

**A82-42629** † **Ear-nose-throat electrodiagnostic device for determining the rheobase of human mucosa and skin (Pribor 'LOR-elektrodiagnostika' dlia opredeleniia reobazy slizistykh obolochek i kozhi cheloveka).** A. G. Zazhivilov (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) and M. P. Dubinianskii (Odesskii Elektrotekhnicheskii Institut Sviazi, Odessa, Ukrainian SSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, May-June 1982, p. 77, 78. In Russian.

**A82-42630** † **Classification of pathological states of the stato-kinetic /vestibular/ analyzer (O klassifitsirovanii patologicheskikh sostoianii stato-kineticheskogo /vestibuliarnogo/ analizatora).** V. S. Olisov (Leningradskii Gosudarstvennyi Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) and V. G. Bazarov (Kievskii Nauchno-Issledovatel'skii Institut Otolaringologii, Kiev, Ukrainian SSR). *Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei*, May-June 1982, p. 52-58. 37 refs. In Russian.

**A82-42631** † **Individual features in the organization of the human endocrinal system (Individual'nye osobenosti organizatsii endokrinnoi sistemy cheloveka).** V. S. Gorozhanin (Kustanaiskii Pedagogicheskii Institut, Kustanai, Kazakh SSR). *Problemy Endokrinologii*, vol. 28, July-Aug. 1982, p. 33-39. 32 refs. In Russian.

A study carried out on 26 healthy males ranging in age from 19 to 28 reveals that there are two diametrically opposed variants in the organization of the endocrinal system. One is characterized by high activity of the sympathetic adrenal and hypophysial adrenal systems, high activity of the insular apparatus of the pancreas, and a comparatively lower activity of the hypophysial thyroid system and gonads. In the other variant, the activities are reversed. The variants are found to be linked to the organization of the nervous system. The first variant corresponds to a nervous system where hypothalamic, reticular, and amygdala effects prevail over the inhibiting effects of the neopallium, the corpus striatum, septo-hippocampal system, and the epiphysis. In the other variant, the prevalence is reversed. It is believed that individual features of the endocrine system may be responsible for such disorders as hypothalamic obesity, hypertension, acromegaly, and bronchial asthma. C.R.

**A82-42632** † **Features of information processing in the right and left hemispheres of the human brain /A survey of the literature/ (Osobennosti pererabotki informatsii v pravom i levom polushariiakh mozga cheloveka /Obozor literatury/).** B. I. Belyi. *Zhurnal Nevropatologii i Psikhiatrii im S. S. Korsakova*, vol. 82, no. 7, 1982, p. 1091-1098. 81 refs. In Russian.

**A82-42633** † **Morphological criteria for diagnosing pathologies of the thymus with myasthenia (Morfologicheskie kriterii diagnostiki patologii timusa pri miastenii).** V. A. Rykov (Novokuznetskii Institut Usovershenstvovaniia Vrachei, Novokuznetsk, USSR). *Zhurnal Nevropatologii i Psikhiatrii im S. S. Korsakova*, vol. 82, no. 7, 1982, p. 1033-1038. 10 refs. In Russian.

**A82-42634** † **Functional conditions of the brain and cerebral pathology (Funktsional'nye sostoianiia mozga i tserebral'naia patologiia).** A. M. Vein and N. N. Iakhno (Moskovskii Meditsinskii Institut, Moscow, USSR). *Zhurnal Neuropathologii i Psikhiatrii im. S. S. Korsakova*, vol. 82, no. 7, 1982, p. 1015-1020. 24 refs. In Russian.

The role of organic and functional factors in the pathogenesis of diseases of the central nervous system is reviewed. Studies of neurological diseases present in various functional conditions of the brain are discussed, and the neurophysiological and neurochemical mechanisms of these conditions are examined. It is concluded that clinical studies of Parkinsonism, epilepsy, and other diseases in patients, both during sleep and while awake, show the importance of such functional investigations of the pathogenesis of neurological diseases of the brain. N.B.

**A82-42635** † **Neurophysiological mechanisms of the compensation of motor disturbances in the presence of lesions of the pyramid system /An electromyographic analysis/ (O nekotorykh neirofiziologicheskikh mekhanizmakh kompensatsii dvigatel'nykh narushenii pri porazheniiakh piramidnoi sistemy /Elektromiograficheskii analiz/).** V. P. Novikova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova*, vol. 82, no. 7, 1982, p. 1010-1014. 17 refs. In Russian.

**A82-42636** † **The influence of afferent visual impulses on the morphological and biochemical parameters of the development of the neurons of the visual, motor, and parietal cerebral cortices (O vliianii afferentnykh zritel'nykh impul'sov na morfologicheskie i biokhimicheskie pokazateli razvitiia neironov zritel'noi, dvigatel'noi i temennoi kory mozga).** L. M. Gershtein and L. A. Kukuev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova*, vol. 82, no. 7, 1982, p. 974-980. 19 refs. In Russian.

**A82-42637** † **Morphological features of the individual structure of the human brain (Morfologicheskie osobennosti individual'nogo stroeniia mozga cheloveka).** I. N. Bogolepova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova*, vol. 82, no. 7, 1982, p. 972-974. 8 refs. In Russian.

The variations in the morphological structure of the human brain were examined in 205 individuals. Results show a great variation in the brain weights of different individuals, particularly for each hemisphere. In addition, an examination of the variations of the rostrocaudal length showed that in a majority of individuals the rostrocaudal length was longer in the left hemisphere than in the right. The logomotor areas 44 and 45 exhibited variabilities in the total volumetric fraction and in the neuronal composition of layers III and V. N.B.

**A82-42638** † **An experimental study of the human blood-cerebral barrier using scanning electron microscopy (Opyt izucheniia gematolikvornogo bar'era cheloveka metodom skaniruiushchei elektronnoi mikroskopii).** A. I. Kiktenko (Akademiia Meditsinskikh Nauk, SSSR, Moscow, USSR). *Zhurnal Nevropatologii i Psikhiatrii im S. S. Korsakova*, vol. 82, no. 7, 1982, p. 968-971. 22 refs. In Russian.

The results obtained in examining the epithelium of the choroid plexuses of the lateral ventricles using scanning electron microscopy are described. A superficial morphological picture makes it possible to distinguish four types of cells in the choroid plexus epithelium, namely cells bearing microvilli on the surface presented to the ventricle lumen, cells having a relatively smooth surface, cells bearing scanty cilia, and cells characterized by large processes. The diversity in the morphological picture of the surface of the choroid plexus epithelium cells is seen as a manifestation of the activity of the barrier between the blood and cerebrospinal fluid represented by those cells. C.R.

**A82-42794** # **Aerial combat simulation in the U.S. Air Force.** P. A. Cook (USAF, Human Resources Laboratory, Williams AFB, AZ). *Astronautics and Aeronautics*, vol. 20, Sept. 1982, p. 60-65.

Progress in techniques and equipment for successful computer image generation (CIG) combat simulator trainers for the pilots of A-10 and F-16 fighters are described. An advanced simulator features seven visual display screens on a dodecahedron structure to give 300 deg horizontal and 140 deg vertical field of view on 36 in. CRTs, all mounted on a six-degree-of-freedom motion platform. Combat simulation training with F-5 pilots yielded improved performances in actual practice combat flights. SAM missile launches and antiaircraft fire can be simulated, along with full combat maneuvering, although representation of enemy planes is still limited to 2-3 km distance at most. Twin cockpits permit joint missions to be flown against a third, visually projected target field. Further advances in helmet-mounted simulations and coupling of actual weapons systems electronics to simulator displays are discussed. M.S.K.

**A82-42829** **Vibration and comfort. I - Translational seat vibration.** M. J. Griffin, E. M. Whitham, and K. C. Parsons (Southampton, University, Southampton, England). *Ergonomics*, vol. 25, July 1982, p. 603-630. 19 refs.

The effects of level, frequency, and duration of the translational vibration of a firm flat seat are investigated as part of a series of studies of discomfort caused by multi-axis vibration at the seat, feet, and back of seated persons. The levels of fore-and-aft, lateral, and vertical seat vibration which causes discomfort equivalent to 0.5 and 1.25 m/sq sec r.m.s. 10 Hz vertical seat vibration are determined at octave center frequencies from 1-63 Hz. In addition, comfort contours equivalent to 0.8 m/sq sec r.m.s. 10 Hz vertical seat vibration and subject transmissibilities are determined at preferred third-octave center frequencies from 1-100 Hz. It is found that the shapes of equivalent comfort contours need not normally depend on vibration level, and significant correlations are found between subject characteristics (size and transmissibility) and subject relative discomfort. A method also is developed to predict the influence of high levels of harmonic distortion on the comfort contours. N.B.

**A82-42830** **Vibration and comfort. II - Rotational seat vibration.** K. C. Parsons and M. J. Griffin (Southampton, University, Southampton, England). *Ergonomics*, vol. 25, July 1982, p. 631-644. 7 refs.

The effects of level, frequency, and direction of the roll, pitch, and yaw vibration of a firm flat seat are studied to investigate the discomfort produced by rotational seat vibration. The levels of roll, pitch, and yaw seat vibration which causes discomfort equivalent to 0.5 and 1.25 m/sq sec r.m.s. 10 Hz vertical seat vibration are determined at octave center frequencies in the range 1-31.5 Hz. In addition, the comfort contours equivalent to 0.8 m/sq sec r.m.s. 10 Hz vertical seat vibration are determined at preferred third-octave center frequencies from 1-31.5 Hz. Results for both individual and group equivalent comfort contours show that the shape of the contours need not normally depend on vibration level. The median contours of vibration acceleration increase in proportion to vibration frequency in all three axes, while sensitivity is greatest for roll vibration and least for yaw vibration of the seat. N.B.

**A82-42831** **Subjective response to whole-body vibration - The effects of posture.** D. J. Oborne and P. A. Boarer (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 25, July 1982, p. 673-681. 23 refs. Research supported by the Social Science Research Council.

In an investigation of the effects of posture on subjective responses to whole-body vibration, 20 undergraduate subjects produced equal sensation contours adopting three postures each on different occasions. The postures adopted were standing, sitting upright and sitting slouched. The results indicated significant differences in the contour shapes from the three postures, and the level set in the sitting postures were significantly lower than in the standing posture. No difference was obtained between the two sitting postures. Implications of these findings are discussed regarding the role of transmissibility in subjective response to vibration, and the necessity to produce different standards for different postures. (Author)

**A82-42900** **Three stimuli for visual motion perception compared.** H. Wallach, M. L. McMahon (Swarthmore College, Swarthmore, PA), and A. O'-Leary (Stanford University, Stanford, CA). *Perception and Psychophysics*, vol. 32, no. 1, July 1982, p. 1-6. 7 refs. Grant No. PHS-11089.

Two arrangements yielding induced motion were used to explore the relative effectiveness of three stimulus conditions known to produce perception of motion - namely, image displacement, ocular pursuit, and object-relative displacement. In these arrangements, object-relative displacement, which resulted in induced motion, was in conflict either with ocular pursuit or with image displacement. The outcomes of these conflicts were determined by measuring the extent of induced motion. Image displacement proved more effective in competing with object-relative displacement than did ocular pursuit, which in one arrangement yielded to object-relative displacement entirely. The same pattern of results was obtained both with the usual arrangement of the moving-center type and with a stationary-center display. (Author)

**A82-42993** † **Methods of human adaptation to heat (O metodike teplovoi adaptatsii cheloveka).** A. T. Mar'ianovich. *Voenno-Meditsinskii Zhurnal*, July 1982, p. 41-43. 8 refs. In Russian.

Experiments were conducted to evaluate the discrete or discontinuous method of adaptation to heat, in which a tolerance to heat is built up by short exposures (of the order of 10 minutes) to extremal thermal effects. It is shown that, in certain cases, the discrete method involving the effect of an extremal heat factor is superior to the method of continuous exposure to a lower-intensity heat factor. The discrete method can be used to speed up the heat-adaptation process. B.J.

**A82-42994** † **Analysis of methods for evaluating thermal stress (Analiz metodov otsenki termostressa).** V. P. Kovalenko and V. V. Pastukhov. *Voenno-Meditsinskii Zhurnal*, July 1982, p. 43, 44. In Russian.

Various methods for evaluating the functional state of the human body under the effects of heat or cold are analyzed with reference to providing suitable uniforms for military personnel. Rectal temperature, the state of the cardiovascular system, external breathing, the state of the central nervous system, the functioning of the motor analyzer, skin sensitivity, and the state of the sympathico-adrenal system were among the factors evaluated. The condition studied involved extremal temperatures ranging from +45 to -35 C. B.J.

**A82-42995** † **The dynamics of certain psychophysiological indicators under the cumulative effect of Coriolis accelerations (Dinamika nekotorykh psikhofiziologicheskikh pokazatelei pri vozdeistvii kumuliatsii uskorenii Koriolisa).** V. I. Babiiak, L. A. Glaznikov, and V. A. Mozin. *Voenno-Meditsinskii Zhurnal*, July 1982, p. 45-47. 8 refs. In Russian.

Indicators of simple and complex sensorimotor reaction before and after the effect of the continuous accumulation of Coriolis acclerations were studied in subjects with varying degrees of resistance to motion sickness. It is shown that the simple sensorimotor reaction is not an informative indicator in the case of cumulative Coriolis acclerations. The complex sensorimotor reaction more adequately reflects the psychophysiological state of the body in the case of the appearance of the motion-sickness syndrome (even in its latent forms). B.J.

**A82-42996** † **Individual features of the vegetative regulation of body functions during the adaptation of sailors in the tropics (Individual'nye osobennosti vegetativnoi reguliatsii funktsii organizma pri adaptatsii moriakov v tropikakh).** V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal*, July 1982, p. 48. In Russian.

**A82-42997** † **Microcirculation during acute blood loss and hypoxia (Mikrotsirkuliatsiia pri ostroi krovopotere v usloviiakh gipoksii).** L. A. Terent'ev. *Voenno-Meditsinskii Zhurnal*, July 1982, p. 49, 50. In Russian.

The microcirculation state (as reflected in arterial-pressure indices and EKG data) in dogs was studied under conditions of the separate and combined effects of acute blood loss and hypoxia. Blood circulation was found to be considerably disrupted in animals not adapted to oxygen deficit in inhaled air under the combined effect of hypoxic and hemic hypoxia. The preliminary adaptation of the dogs to hypoxia was shown to increase their resistance to blood loss. B.J.

**A82-43045** **Effect of dosed physical loading on plasma and liver lipids and lipoproteins in rats.** L. N. Dakovska and V. T. Orbetsova (Meditsinska Akademiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 35, no. 4, 1982, p. 549-552. 11 refs.

The quantity of total lipids (TL), phospholipids (PhL), and free fatty acid (FFA) are investigated using Boehringer test reagents in adequate aliquots of blood plasma or purified Folch extracts (evaporated to dryness at 60 C). The lipoproteins (LP) are separated in two ways. For qualitative purposes, electrophoretic techniques (discacrylamide electrophoresis) are used; for a quantitative determination of cholesterol (Ch) and triglycerides (TGl) in the LP, Wilson's dual-precipitation method is used. It is found that the quantity of total lipids and total Ch in the experimental group does not differ from that of the controls. The content of PhL shows an upward tendency and that of TGl is significantly higher. C.R.

**A82-43046** **Effect of dosed physical loading on biological oxidation and bioenergy in liver and myocardium.** V. T. Orbetsova, L. N. Dakovska, M. P. Anastasova, N. N. Iavorska, and M. T. Pesheva (Meditsinska Akademiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 35, no. 4, 1982, p. 553-556. 7 refs.

Experiments with two plasticizers (Santisizer and Condea) are carried out on seven groups of 10 male rats whose body weights range from 200-240 g. The plasticizers are applied dermally using Draize's method: 21 daily applications five times a week in doses of 4, 1, and 0.5 ml/kg. During the 21-day period, no changes are observed in the behavior, general condition, food consumption, and body weight of the animals. The activity of oxidizing enzymes and phosphatases in the myocardium is determined. It is found that in low doses the phthalate plasticizers do not substantially change all the enzyme activities tested in myocardium homogenates. C.R.

**A82-43099** **Contrast increment thresholds of rhesus monkeys.** E. L. Smith, III, R. S. Harweth, D. M. Levi, and R. L. Boltz (Houston, University, Houston, TX). *Vision Research*, vol. 22, no. 9, 1982, p. 1153-1161. 30 refs. Grants No. NIH-EY-03611; No. NIH-EY-01139; No. NIH-EY-01728.

Increment contrast thresholds were determined behaviorally as a function of background contrast for sinusoidal gratings with spatial frequencies between 0.5

and 8.0 c/deg. As has been previously reported for humans, the contrast discrimination functions were characterized by a facilitation effect for low background contrasts and a masking effect for high background contrasts. The shapes of the functions varied with spatial frequency, but for all spatial frequencies, portions of the functions were adequately described by a power law. The shapes of the reaction time distributions obtained for near threshold stimuli suggested that at least two mechanisms with different spatio-temporal sensitivities were involved in detecting the stimulus and that the exact shape of the contrast discrimination function was dependent on which mechanism dominated detection. (Author)

**A82-43100** **Hyperacuity and interpolation by the visual pathways.** A. W. Snyder (Australian National University, Canberra, Australia). *Vision Research*, vol. 22, no. 9, 1982, p. 1219, 1220. 12 refs.

Hyperacuity demands some form of neural interpolation. This places constraints on the relation between optical image quality and the cone mosaic. In particular, if the cone mosaic significantly undersamples the optical image, then hyperacuity is downgraded. This fact is consistent with the comparatively poor hyperacuity in the peripheral retina of man. (Author)

**A82-43145** **Computer simulation of respiratory control system.** N. Suzuki and A. Uchiyama (Waseda University, Tokyo, Japan). *Electronics and Communications in Japan*, vol. 63, Nov. 1980, p. 118-126. 8 refs. Translation.

A computer simulation of the human respiratory control system is carried out using a model which incorporates the diffusion phenomenon and gas transport delay. The response of the respiratory system to carbon dioxide inhalation, a lack of oxygen in the inhaled air, and possible damage within the system is investigated within the framework of the proposed model. Finally, several methods for refining the model are suggested. V.L.

**A82-43221** † **Interpretation of Viking biology experiments (K voprosu ob interpretatsii biologicheskikh eksperimentov na KA 'Viking').** A. V. Garbuz, L. M. Mukhin, S. L. Orlov, and A. I. Shafiev. *Kosmicheskie Issledovaniia*, vol. 20, July-Aug. 1982, p. 651-653. 9 refs. In Russian.

An experiment has been carried out in which soil samples imitating Martian soil were irradiated with high-energy electrons and gamma quanta. Results suggest that radiation defects accumulating in Martian soil due to the effect of cosmic rays may be one of the sources of the gases that were detected by the Viking spacecraft in the Martian atmosphere. V.L.

**A82-43222** † **Comparative analysis of the biological effects of electromagnetic radiation. II - Eye damage. Cataractogenesis (Sravnitel'nyi analiz biologicheskikh effektov elektromagnitnykh izluchenii. II - Porazhenie glaz. Kataraktogenez).** B. I. Davydov, V. S. Tikhonchuk, and V. V. Antonov. *Kosmicheskie Issledovaniia*, vol. 20, July-Aug. 1982, p. 653-655. 20 refs. In Russian.

The available literature on cataracts induced by microwave radiation in animals and humans is briefly reviewed. It is found that microwave radiation produces cataracts in animals at frequencies of 2450-3000 and 10,000 MHz; cataractogenesis is not observed at lower frequencies. Equations are presented for extrapolating thresholds for reversible eye changes and for cataractogenesis in humans subjected to microwave radiation. The threshold of functional and organic changes of the human eye is a function of absorbed dose and dose power. B.J.

**A82-43230** † **Threshold models of spatial vision (Porogovye modeli prostranstvennogo zreniia).** V. D. Glezer (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 547-558. 43 refs. In Russian.

A comparative analysis is presented of neurophysiological studies of receptive fields and psychophysiological data concerning the detection and recognition of simple images, and the discrimination of textures. A threshold detection model is described which is based on a set of independent elements whose weighting function is the difference of two Gaussians; the elements are combined by spatial-probabilistic summation. A threshold recognition model is proposed which is based on a set of detector gratings of different frequencies. The texture discrimination model consists of nonlinear incoherent spatial-frequency filters. The neurophysiological correlates of each of these three types of spatial elements are discussed. B.J.

**A82-43231** † **Dynamics of the process of the determination of orientation by man (Dinamika protsessa otsenki orientatsii chelovekom).** N. B. Kostelianets and V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 559-563. 14 refs. In Russian.

The accuracy of human visual determination of the orientation of a line was evaluated as a function of the time set aside for this task. This time was limited either by masking with one image or by the additional task of recognizing one of three possible masking images. In the first case, a monotonic dependence of the precision of orientation determination on the time interval between the test and masking images was found. The second case showed a nonmonotonic dependence. Possible neurophysiological mechanisms for this difference are discussed. B.J.

**A82-43232** † **Factors determining the characteristics of the perception of stabilized retinal images (O faktorakh, opredeliaiushchikh osobennosti vospriiatiia stabilizirovannykh setchatochnykh izobrazhenii).** G. I. Rozhkova, P. P. Nikolaev, and V. E. Shchadrin (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 564-571. 21 refs. In Russian.

It is shown that given the same precision of stabilization of retinal images but different conditions and parameters of stimulation it is possible to observe either irreversible fading of visual images or their prolonged existence. The observed images differ significantly in their temporal evolution: they can disappear after a few seconds or last for many minutes, smoothly fade and fluctuate or maintain their sharpness for a long time and gradually fade. Anatomical, physiological, and psychological factors are examined which might explain these features of the perception of stabilized images. It is suggested that the formation of images in conditions of stabilization might be facilitated by the high contrast and large size of the test field, the high contrast of test objects, and the presentation of matched stimuli to both eyes (i.e., the simulation of binocular vision). B.J.

**A82-43233** † **Mechanisms of the damaging effect of light on retinal photoreceptors (Mekhanizmy povrezhdaiushchego deistviia sveta na fotoretseptory setchatki glaza).** M. A. Ostrovskii and I. B. Fedorovich (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 572-577. 16 refs. In Russian.

Data on light-produced damage in the human retina are examined. It is shown that prolonged exposure to bright light mainly imperils those who are prone to eye diseases, and that the light effect consists in damage to photoreceptors, which destroys their contacts with pigment epithelium. The mechanism for this damaging effect of light is shown to be the oxidation of rhodopsin and lipids (the molecular components of the photoreceptor membrane) which is photoinduced by the end products of photolysis of the retinal pigment. Ways to protect the eyes from this type of damage are discussed. B.J.

**A82-43234** † **Brain-stem auditory evoked potentials in persons with normal hearing (Korotkolatentnye slukhovye vyzvannye potentsialy u liudei s normal'nym slukhom).** B. M. Sagalovich and G. G. Melkumova (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 578-584. 25 refs. In Russian.

Brain-stem auditory evoked potentials were recorded in 40 persons (with ages ranging from 18 to 25) with normal hearing. It is shown that the latent periods of the principal waves of the potentials are characterized by low intrasubject and intersubject variability, whereas their amplitudes are extremely unstable. These potentials are masked by white noise, the character of the masking being determined by the relationship between the superthreshold intensity of the masker and the masked auditory click. It is concluded that both fast and slow auditory evoked potentials should be recorded in order to obtain complete information about the objective condition of hearing. B.J.

**A82-43235** † **Psychophysical characteristics of perception and bioelectric activity of the brain during micropolarization of the occipital part of the hemispheres (Psikhofizicheskie kharakteristiki vospriiatiia i bioelektricheskaia aktivnost' mozga pri mikropoliarizatsii zatylochnoi oblasti polusharii).** I. A. Korsakov and L. V. Matveeva (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Obshchei i Sudebnoi Psikhiatrii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 595-603. 10 refs. In Russian.

**A82-43236** † **Electrocardiographic correlates of emotional stress (K voprosu ob elektrokardiograficheskikh korreliatakh emotsional'nogo napriazheniia).** E. I. Sokolov and E. V. Belova (Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 609-614. 15 refs. In Russian.

EKG studies were performed on 33 healthy human subjects (with ages ranging from 17 to 23) who were subjected to emotional stress. It is shown that the main changes produced by emotional stress are in the P and T waves. These changes have different signs and depend on the type of vegetative regulation. Changes in the shape and amplitude of the P wave are found to be an index of emotional stress. B.J.

**A82-43237** † **Physiological mechanisms determining the mechanical work of breathing for different types of muscular activity (Fiziologicheskie mekhanizmy, opredeliaiushchie rabotu dykhaniia pri razlichnykh vidakh myshechnoi deiatel'nosti).** V. V. Gritsenko, V. I. Gavrilenkov, and O. Iu. Momchalov (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 8, July-Aug. 1982, p. 615-621. 20 refs. In Russian.

Experiments were performed on healthy young human subjects under conditions of rest, voluntary hyperventilation, and physical exercise (ergometer loads of 10 to 125 W on the upper and lower extremities). An analysis of respiratory and cardiovascular indicators showed that the main factors determining the mechanical work of breathing during muscular activity are the intensity of ventilation, the blood level in lung vessels, and the breathing volume. The influence of these factors is more pronounced during manual exercise and in women. B.J.

**A82-43238** † **The effect of body position and the administration of a diuretic on the water-salt status and the activity of the kidneys (Vliianie polozheniia tela i priema diuretika na vodno-solevoi status i deiatel'nost' pochek).** V. B. Noskov. *Fiziologiia Cheloveka,* vol. 8, July-Aug. 1982, p. 636-641. 12 refs. In Russian.

Experiments were performed on 10 healthy males in order to evaluate the effect of orthostatic and antiorthostatic (-20 deg) body positions and the administration of a diuretic on the indicators of the natruretic function of the kidneys and the water-electrolyte status. The antiorthostatic position and the peroral administration of the diuretic are found to produce regular changes in the water-salt homeostasis and in the activity of the kidneys; these changes are determined by a decrease in the reabsorption of fluid and salts. The combined action of the antiorthostatic position and the diuretic is found to constitute a synergistic effect. B.J.

**A82-43239** † **The relationship between postural components and voluntary movement (Sviaz' poznykh komponentov s proizvol'nym dvizheniem).** N. V. Kholmogorova (Moskovskii Gosudarstvennyi Pedagogicheskii Institut, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, July-Aug. 1982, p. 642-652. 22 refs. In Russian.

Experiments performed on 30 healthy human subjects showed that changes in muscular postural activity precede voluntary movement if the latter produces a change in the center of gravity of the body. This postural anticipation of movement was disclosed in the case of the lifting of the arms as well as in the case of stabilization of the body with a horizontally outstretched arm. Local arm movement was preceded by a preparatory period of postural reactions, including two components: the inhibition of the background activity of a series of muscles and the anticipatory activity of leg muscles. B.J.

**A82-43240** † **Evaluation of the heaviness of physical work with marked nervous-emotional stress (Otsenka tiazhesti truda pri fizicheskoi rabote s vyrazhennym nervno-emotsional'nym napriazheniem).** D. M. Demina, M. N. Evlampieva, A. B. Kirpichnikov, and E. M. Ratner (Ministerstvo Putei Soobshcheniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, July-Aug. 1982, p. 660-664. 8 refs. In Russian.

**A82-43329** # **The role of the test pilot in flight tests (Die Rolle des Testpiloten bei der Flugerprobung).** D. Thomas (Dornier GmbH, Friedrichshafen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über angewandte Flugwissenschaften bei der Entwicklung des Alpha Jet, Darmstadt, West Germany, Sept. 24, 1981, Paper.* 19 p. In German.

A description is presented of various aspects related to the development of an aircraft, taking into account the experience of the project pilot in connection with the development of the Alpha Jet aircraft. The Alpha Jet was developed as a training aircraft and bomber aircraft in a joint project by French and German aerospace companies. Attention is given to the objectives of flight tests, the functions of the test pilot in connection with the development of the aircraft, details concerning the daily activities of a test pilot, the determination of flight performance, comments concerning the duration and extension of the flight tests, weapons tests, and approaches for avoiding aircraft accidents due to poststall gyration. G.R.

**A82-43383** **Regulation of circadian rhythmicity.** J. S. Takahashi (National Institutes of Health, Laboratory of Clinical Science; National Institute of General Medical Sciences, Bethesda, MD) and M. Zatz (National Institutes of Health, Laboratory of Clinical Sciences, Bethesda, MD). *Science,* vol. 217, Sept. 17, 1982, p. 1104-1111. 106 refs.

An anatomical and physiological basis for circadian rhythmicity in animals is presented. A suprachiasmatic nucleus which displays all basic characteristics of circadian rhythms and multiple oscillators comprise the anatomical basis of the system. Neural activity in the nucleus persists at least 34 cycles after surgical isolation, and evidence suggests that the nucleus acts as a pacemaker within the mammalian system. The pacemaking system normally functions as a single oscillator, but evidence shows the possibility of a multioscillator system. Two organizational types may be the basis for this system: a dominant pacemaker imposes itself on the system, or a mutually coupled system shares the role. The biochemical analysis reveals two regulators of the system: the pineal gland which expresses a driven rhythm, and the Aplysia eye whose phase-shifting effects are mediated by the synthesis of adenosine 3',5'-monophosphate. Potentially useful experimental systems to study the oscillator biochemical components of multicellular organisms have emerged. R.K.R.

**A82-43388** **Use of physiological information in man-machine systems.** A. A. Desova. *(Avtomatika i Telemekhanika, Jan. 1982, p. 151-166.) Automation and Remote Control,* vol. 43, no. 1, June 20, 1982, pt. 2, p. 122-135. 124 refs. Translation.

Attention is given to the use of physiological information on the condition and characteristics of the human operator in designing, studying, and operating man-machine systems. Groups of specialized engineering psychological criteria are developed that characterize practical problems. The main steps of a methodological approach for obtaining formalized estimates of physiological information are formulated and described. An approach to obtaining a quantitative estimate of the human operator's functional state is suggested and then developed in an example of scale formulation for operating tension. C.R.

**A82-43513** † **Internal stresses and contractility of myocardium (Vnytrennye napriazheniia i sokratitel'naia sposobnost' miokarda).** G. S. Pisarenko, V. V. Kriveniuk, A. A. Moibenko, T. P. Sivachenko, and A. K. Belous (Akademiia Nauk Ukrainskoi SSR, Institut Problem Prochnosti, Kiev, Ukrainian SSR). *Mekhanika Kompozitnykh Materialov,* July-Aug. 1982, p. 690-694. 6 refs. In Russian.

Model computations of stresses in the left ventricle due to external load and systolic contraction of the myocardial elastic component are presented. Analysis of the data obtained, taken in conjunction with the results of certain physiological experiments reported in the literature, shows that the final systolic volume is an important indicator of the contractile function of myocardium. V.L.

**A82-43602** † **Mental hygiene of sailors (Psikhogigiena moriaka).** Iu. M. Sten'ko. Leningrad, Izdatel'stvo Meditsina, 1981. 176 p. 194 refs. In Russian.

The social-psychological and physiological factors involved in the adaptation of sailors to the conditions of sailing, the lowering of the incidence of illness on cruises, and increasing the social activity and efficiency of sailors are examined. The peculiarities of the working and climatic conditions on ships at sea are discussed, and concrete recommendations are provided for the organization of work during prolonged cruises at various latitudes, prophylactic hypodynamics, the formation of stable working groups on ships, and the organization of rest and relaxation on board ships as well as in ports. Attention is concentrated on the psychological climate and the interrelations of the group. N.B.

**A82-43607** † **Sleep and motor activity: Stages of the ontogenic evolution of the supraspinal motor control in the human sleep cycle (Son i dvigatel'naia aktivnost': Etapy ontogeneticheskoi evoliutsii supraspinal'nogo motornogo kontrolia v tsikle sna u cheloveka).** I. A. Vakhrameeva. Leningrad, Izdatel'stvo Nauka, 1980. 152 p. 258 refs. In Russian.

**A82-43610** † **Thermogenesis and muscle activity during the adaptation to cold (Termogenez i myshechnaia deiatel'nost' pri adaptatsii k kholodu).** Iu. I. Bazhenov. Leningrad, Izdatel'stvo Nauka, 1981. 105 p. 392 refs. In Russian.

The role of muscle activity in the process of the adaptation of homeothermic animals to cold is reviewed. The changes in the energetics of the various forms of muscular activity during individual and specific acclimations to low environmental temperatures are analyzed. The role of muscle activity in the development of the adaptive changes of thermogenesis is discussed in detail. In addition, the basic principles of the compensatory interaction between the specific thermoregulatory and motor functions of the muscles during the division and combination of the influence of cold and muscle activity on an organism are presented. N.B.

**A82-43611** † **The morphology of the connections of the cortical vestibular zone (Morfologiia sviazei korkovoi vestibuliarnoi zony).** A. S. Iontov, V. A. Kisliakov, T. F. Kuleshova, F. N. Makarov, and V. A. Otellin. Leningrad, Izdatel'stvo Nauka, 1980. 128 p. 365 refs. In Russian.

The physiology of the cortical connections of the vestibular apparatus in several animals is reviewed. Also discussed is the input-output switching of the vestibular impulses which enter the cerebral cortex. Recent morphological data about the associative and commissural connections with the vestibular nuclei of the medulla oblongata and with the formations of the striopallidal complex are examined. In addition, results of electron microscopic investigations concerning the reactivity of the vestibular cortex to the action of gravitational overloads are presented. N.B.

**A82-43627** † **The intracentral connections of the brain structures participating in cardiovascular control (O vnutritsentral'nykh sviaziakh mozgovykh struktur, uchastvuiushchikh v reguliatsii krovoobrashcheniia).** M. I. Gurevich, A. G. Kartseva, and V. A. Maiskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 68, Aug. 1982, p. 1025-1031. 11 refs. In Russian.

The hemodynamic responses to the electrical stimulation of different hypothalamus structures, and to simultaneous electrical stimulations of the sinus nerve and the hypothalamus are studied in anesthetized vagotomized cats. In addition, the monosynaptic hypothalamic connections to the brain and spinal cord are investigated. Results show that the hypothalamus influences the efferent link in the regulation of cardiovascular control by means of the activation of various descending pathways both through the bulbar level of regulation as well as by omitting it. A scheme of the intracentral monosynaptic connections which participate in cardiovascular control is given. N.B.

**A82-43628 † The role of the integrity of the central synaptic and direct influences in the regulation of hemodynamics (O roli integrativnosti tsentral'nykh sinapticheskikh i priamykh vliianii v reguliatsii gemodinamiki).** K. V. Kovanov (Gosudarstvennyi Meditsinskii Institut, Ternopol, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1049-1056. 18 refs. In Russian.

The interrelationships of the direct and reflex mechanisms, as well as the general organization of the regulation of hemodynamics are investigated in cats and dogs. Results show that the ultimate efferent effects of the central apparatus of hemodynamic regulation result from the integrity of their responses to the sum total of the incoming afferent signals and to the substances in the blood and in the cerebrospinal fluid which act directly on these signals. The types of cytoarchitectonic constructions and morphological structures which could mediate the central effects of these substances and the interrelationships between the reflex and direct mechanisms of regulation are determined by light and electron microscopic studies of the stereohistological organization of the spinal cord. In addition, a scheme for the organization of the central mechanisms of the regulation of hemodynamics and of the reflex arc structure is presented. N.B.

**A82-43629 † An analysis of the role of endogenous opioid peptides in experimental hypertension (Analiz roli endogennykh opioidnykh peptidov pri eksperimental'noi gipertenzii).** A. V. Val'dman, O. S. Medvedev, and N. I. Rozhanskaia (Akademiia Meditsinskikh Nauk, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1091-1095. 18 refs. In Russian.

The effects of endogenous opioid peptides on the parameters of the hemodynamic system and on the functions of the barareceptor reflex are investigated in normotensive rats and in rats with two types of experimental hypertension. In spontaneously hypertensive rats and in rats with one-kidney Goldblatt hypertension, naloxone (0.1 and 1.0 mg/kg body weight) evokes a 10 mm Hg increase in blood pressure, but does not change the sensitivity of the baroreceptor reflex. However, naloxone facilitates this reflex in normotensive rats. A possible role of endogenous peptides in the regulation of blood pressure is proposed in relation to their ability to stimulate mu and delta opiate receptors in the brain. N.B.

**A82-43630 † The mechanisms of hypertensive responses during emotional stress (Mekhanizmy vozniknoveniia gipertenzivnykh reaktsii pri emotsional'nom napriazhenii).** V. A. Tsyrlin (Nauchno-Issledovatel'skii Institut Kardiologii, Leningrad, USSR) and B. G. Bershadskii (I Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1096-1101. 10 refs. In Russian.

The shifts of the hemodynamic system are studied in alert cats exposed to emotional stress that was evoked by electrical stimulation of the hypothalamus or by confining the cats in a closed chamber in which a dog was also present. Results showed that hypertension, expressed in response to a confrontation with a dog, was accompanied by a suppression of the baroreceptor reflexes in the majority of cats tested. After severing the sino-carotid and aortic nerves, no hypertensive responce was observed in these same cats. In two cats, the baroreceptor reflexes were not altered by emotional stress, and deafferentation of the sino-carotic nerve and the arch of the aorta intensified the hypertensive response expressed by the cats during confrontations with dogs. Various mechanisms for the hypertensive response to emotional stress are proposed for various animals. N.B.

**A82-43631 † The mechanisms of the development of the cardiogenic vagosympathetic reflexes (O mekhanizmakh razvitiia kardiogennykh vagosimpaticheskikh refleksov).** A. A. Moibenko, V. B. Pavliuchenko, I. E. Buriakov, and V. M. Shaban (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1103-1110. 27 refs. In Russian.

The mechanisms of the development of the vagosympathetic depressor reflexes during adrenergic stimulation of the heart and during local immune and ischemic damages of the left ventricle are studied in anesthetized dogs and cats by recording the afferent and efferent impulses from the cardiac nerves as well as the cardiodynamic indices. Reciprocal changes are found in the impulse activity of the cardiac nerves. The frequency of the afferent impulses in the vagal nerves increases, while the efferent impulses in the sympathetic nerves are inhibited. It is proposed that the reflex inhibition of sympathetic impulses and of the depressor reflex is triggered by the stimulation of heart mechanoreceptors that is evoked by the increase in myocardial contractility and the asynergy of the left ventricle. N.B.

**A82-43632 † Functional means for the regulation of heart rhythm during burst stimulation of the vagus nerves (Funktsional'nye vozmozhnosti upravleniia ritmom serdtsa pri zalpovom razdrazhenii bluzhdaiushchikh nervov).** V. M. Pokrovskii, Iu. R. Sheikh-Zade, V. M. Kruchinin, A. N. Chugunova, M. V. Pokrovskii, and V. G. Abushkevich (Kubanskii Meditsinskii Institut, Krasnodar, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1112-1115. 14 refs. In Russian.

**A82-43633 † The participation of the hypothalamus in the regulation of parasympathetic cardiac reflexes in unanesthetized cats (Uchastie gipotalamusa v reguliatsii parasimpaticheskikh refleksov na serdtse u nenarkotizirovannykh koshek).** G. E. Samonina, E. I. Pevtsova, and M. G. Udel'nov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1116-1122. 16 refs. In Russian.

**A82-43634 † The responses of the coronary vessels in dogs to hypothalamic stimulation in acute and chronic experiments (Reaktsii koronarnykh sosudov u sobak pri razdrazhenii gipotalamusa v ostrom i khronicheskom opytakh).** A. V. Trubetskoi and V. L. Golubykh (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1123-1129. 15 refs. In Russian.

**A82-43635 † Conjugated changes of the resistance and blood filling of cerebral vessels during shifts in the blood gas composition (Sopriazhennye izmeneniia soprotivleniia i krovenapolneniia sosudov golovnogo mozga pri sdvigakh gazovogo sostava krovi).** V. G. Krasil'nikov and A. I. Artem'eva (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1130-1136. 12 refs. In Russian.

The changes in the resistance and blood filling of cerebral vessels during various concentrations of CO2 and O2 in the blood are studied in anesthetized cats during perfusion of the brain with constant blood volumes. Results show that hypercapnia and hypoxia lead to a decrease in the resistance of the cerebral vessels and to a reduction of the brain blood flow, whereas a decrease in the pCO2 and an increase in the pO2 in the blood exerts an opposite effect. The different responses of the vessels are found to have several similar features in respect to the threshold changes of the pCO2 and pO2, to the potentiation of the effects of both parts of the vascular system of the brain during increased shifts of the blood gas tension, to the greater sensitivity of both parts of the vascular system to changes in pCO2 than in pO2, and to the effect of the blood gas tension on the response of both parts of the vascular system to injections of noradrenaline. It is suggested that an alteration in the filtering and absorption relationships in the brain is caused by the different responses of the arterial and venous vessels to changes in the blood gas tension. N.B.

**A82-43636 † The interrelationship between the pressor response and energy metabolism during isometric muscle contractions (O sviazi pressornoi reaktsii s energeticheskim metabolizmom myshts, sokrashchaiushchikhsia v staticheskom rezhime).** A. V. Vitols, I. P. Kukulis, A. O. Paeglitis, and Ia. V. Skards (Latviiskii Nauchno-Issledovatel'skii Institut, Riga, Latvian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1137-1142. 17 refs. In Russian.

Studies of the pressor response parameters connected with blood flow, energy demands, and maximal isometric work show that the part of the arterial pressure maintained by means of arterial occlusion is dependent upon the energy demands during isometric muscle contractions in humans. It is concluded that a biochemical agent or agents is involved in the formation of the pressor response. N.B.

**A82-43637 † A composite assessment of heart rhythm regulation during dosed functional loads (Kompleksnaia otsenka reguliatsii ritma serdtsa pri dozirovannykh funktsional'nykh nagruzkakh).** N. I. Sapova. *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1159-1164. 16 refs. In Russian.

The regulation of heart rhythm is studied in 152 healthy trained and untrained men during the performance of physical and mental work. Results show that the regulation of heart rhythm during these functional loads is determined both by the initial balance of the sympathetic and parasympathetic effects, and by its variation during the performance of the work. The expression of the sympathetic effects depends on the peculiarities of regulation and on the flow of afferent impulses which enter the central nervous system during the performance of functional tests of various types, efforts, and lengths. A set of indicators for the evaluation of heart rhythm regulation during these tests is proposed. N.B.

**A82-43638 † Liver microcirculation in normoxia and hypoxia (Mikrotsirkuliatsiia v pecheni pri normo- i gipoksemii).** K. P. Ivanov, M. K. Kalinina, Iu. I. Levkovich, N. A. Mal'tsev, and G. P. Mikhailova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, Aug. 1982, p. 1165-1170. 15 refs. In Russian.

The values of the blood flow velocity in the liver sinusoids, and the normal fluctuations of these values and the fluctuations during hypoxic conditions were studied in rat liver sinusoids 11 + or - 1 microns in diameter using the movement of the white blood cells that were flowing in the direction of the red cells as the markers to measure the linear flow velocity. Results showed that the linear flow velocity in normoxic rats was 0.29 + or - 0.01 mm/s and the volumetric flow rate was calculated to be .00165 microliter/min. During hypoxic conditions the blood pressure dropped to 70-80 torr, and the pO2 in the arterial blood and in the portal vein dropped to 45 + or - 3 torr and 18 + or - 3 torr, respectively, as compared with 77 + or - 3 torr and 41 + or - 2 torr during normoxic conditions. The mean sinusoidal blood flow velocity increased by nearly 12%. It was concluded that increased oxygen extraction is the main compensatory mechanism in liver tissue hypoxia. N.B.

**A82-43651** † **The role of the extrapolation and dynamic stereotype in the mechanism of the formation and improvement of adequate motor coordination (Rol' ekstrapoliatsii i dinamicheskogo stereotipa v mekhanizmakh formirovaniia i sovershenstvovaniia adekvatnykh dvigatel'nykh koordinatsii).** N. V. Zimkin (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, July 1982, p. 926-935. 29 refs. In Russian.

An investigation of the tonus, viscosity, bioelectric potentials, force, and endurance of human muscles shows that all of these properties are greatly altered by fluctuations of muscle temperature and oxygen provision, and also by the processes of dynamic work or static efforts at 25, 50, and 75% of maximal strength. It is found that these results are not in accordance with the theory of the mechanism of the dynamic stereotype. The inner structure of the motor apparatus is permanently altered not only during work, but also during the restitution period. Due to its plasticity, the nervous system has a high capacity for extrapolation and can adequately react to new tasks which arise with changes in the internal or external environment. Extrapolation is improved by training, but decreases after the cessation of training. N.B.

**A82-43652** † **The adaptive control of vegetative processes (Adaptivnoe upravlenie vegetativnymi protsessami).** N. N. Vasilevskii and Z. A. Aleksanian (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, July 1982, p. 948-952. 17 refs. In Russian.

Clinical investigations of the control of the cardiovascular system by using biofeedback methods are presented. Results showed that rabbits and cats were able to shift their blood pressure level and to alter their heart rate, while humans were found to be able to regulate their heart rhythm using similar methods. In addition, it was found that these methods can modulate the endogenous biorhythm in a range of 15-20 s, and this regulation can be controlled not only in the central nervous system (hypothalamus), but also during the registration of peripheral function of the cardiovascular system (the blood pressure system, heart rhythm). It is concluded that these results indicate the existence of a general mechanism of adaptation to innovation (adaptive rhythm). N.B.

**A82-43653** † **The effect of drugs altering the exchange of cAMP on the bioelectrogenesis of skeletal muscles (Vliianie preparatov, izmeniaiushchikh obmen tsAMF, na bioelektrogenez skeletnykh myshts).** I. A. Patrin, A. S. Mozzhukhin, and V. O. Samoilov (Gosudarstvennyi Institut Fizicheskoi Kul'tury; Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, July 1982, p. 970-975. 22 refs. In Russian.

In isolated sartorius muscles from frogs, the bioelectrical characteristics of separate fibers of different groups (dark, light, and intermediate) were studied using microelectrodes in conjunction with in vivo television microscopy in order to determine the effect of drugs which alter cAMP exchange (adrenaline, caffeine, and imidasol) on the resting and action potentials of these muscles. Results showed that 0.00001 M concentrations of these drugs affect the generation potentials in the different fibers to varying degrees, and that the effect of these drugs is more pronounced in the case of excitatory potentials. In addition, a mechanism to account for the effects of these drugs on the bioelectric generation in skeletal muscles is presented. N.B.

**A82-43654** † **The effect of a physiological load on the exchange and phosphorylation of cell membrane proteins in the brain of rats (Vliianie fiziologicheskoi nagruzki na obmen i fosforilirovanie belkov kletochnykh membran mozga krys).** V. N. Vitvitskii and L. V. Vitvitskaia (Akademiia Nauk SSSR, Institut Obshchei Genetiki, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, July 1982, p. 992-998. 14 refs. In Russian.

**A82-43655** † **Changes of the functional condition of the neocortex during direct application of optical radiation (Izmeneniia funktsional'nogo sostoianiia neokorteksa pri priamom deistvii opticheskogo izlucheniia).** V. A. Velling, G. V. Gal'dinov, and S. A. Gromova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 68, July 1982, p. 999-1006. 20 refs. In Russian.

The action of optical radiation on the bioelectrical activity of the neocortex and the penicillin-induced epileptigenic focus is investigated in rabbits and cats. Results show that the direct action of ultraviolet radiation at wavelengths of 280, 310, and 365 nm leads to an increase in the amplitude of the EEG and intensifies the epilepiform activity, while the action of radiation above the threshold value at wavelengths of 580 and 630 nm evokes a decrease in the EEG amplitude and a suppression of the epileptiform activity. It is proposed that the mechanism of action of ultraviolet radiation on the bioelectric activity of the neocortex is based on changes in the permeability of neural membranes for sodium and potassium ions and on the subsequent depolarization of the membranes. The action of visible radiation appears to lead to the injuring of the neurons by heat in the irradiated zones, which results in an irreversible suppression of their activity and a reduction of the EEG amplitude. N.B.

**A82-43665** † **The mechanism of the activating effect of anti-cardiac antibodies on the electrical and contractile activity of myocardial cells (O mekhanizme aktiviruiushchego deistviia protivoserdechnykh antitel na elektricheskuiu i sokratitel'nuiu aktivnost' miokardial'nykh kletok).** N. V. Il'chevich and R. I. Ianchii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, July-Aug. 1982, p. 401-409. 24 refs. In Russian.

**A82-43666** † **Heart antigens (Antigeny serdtsa).** G. M. Butenko, A. A. Moibenko, and O. V. Shablovskaia (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, July-Aug. 1982, p. 485-491. 59 refs. In Russian.

Studies of heart antigens in humans and other animals are reviewed, including work on heart specific antigens as well as antigens specific for other organs, such as the kidneys, liver, and skeletal muscles, in addition to the heart. The characteristics of heart specific antigens are summarized, and information about their intracellular localization is presented. In addition, the action of specific anti-heart antibodies on the heart is discussed. N.B.

**A82-43671** † **Study of the morphological and biological properties of obligate and facultative psychrophylic bacteria found in the Antarctic (Izuchenie morfologicheskikh i biologicheskikh svoistv obligatnykh i fakul'tativnykh psikhrofil'nykh bakterii, vydelennykh v usloviiakh Antarktidy).** R. Iu. Tashpulatov, V. M. Bondarenko, and N. S. Dusmukhamedov. *Antarktika*, no. 20, 1981, p. 169-182, 184. 17 refs. In Russian.

**A82-43674** **Vibration and comfort. III - Translational vibration of the feet and back. IV - Application of experimental results.** M. J. Griffin, K. C. Parsons, and E. M. Whitham (Southampton, University, Southampton, England). *Ergonomics*, vol. 25, Aug. 1982, p. 705-719, 721-739. 42 refs.

The effect on human comfort of the frequency and direction of the translational vibration of a footrest and a flat firm backrest are investigated. The levels of fore and aft, and lateral and vertical vibration of the feet of seated subjects which causes discomfort equivalent to that from 0.8 m/s sq r.m.s. 10 Hz vertical vibration of a firm flat seat are determined at frequencies ranging from 2.5-63 Hz. The levels of fore and aft, and lateral and vertical vibration at the back of a seat, equivalent to 0.8 m/s sq r.m.s. 10 Hz vertical seat vibration, are also determined. Results are presented in the form of individual and group equivalent comfort contours. It is found that the contours for vibration of the back show a high sensitivity to fore and aft vibration. N.B.

**A82-43675** **Variability in human response to whole-body vibration - The effects of instructions.** D. J. Oborne and P. A. Boarer (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 25, Aug. 1982, p. 759-769. 12 refs. Research supported by the Social Science Research Council.

Two studies are described in this paper with the aim of assessing the degree to which the instructions given to a subject during an experiment designed to investigate human reaction to vibration, affect the vibration equal sensation contour which is produced. In the first study, 100 subjects produced equal sensation contours by equating pairs of vibration stimuli. After each pair, subjects were required to record the basis on which they had made their judgments. The results demonstrated that subjects differ in the concepts which they use to equate vibration stimuli, although the majority equate in terms of the degree to which parts of the body are shaken. In the second study, 48 subjects were required to produce equal sensation contours using the terms of either 'comfort' or 'discomfort' or 'body shake' or 'sensation'. The overall contour shapes produced by the four instruction groups were not significantly different, although the frequency ranges of maximum vibration sensitivity were shown to be significantly different. Implications of these findings are discussed. (Author)

**A82-44133** **Effects of beta-adrenergic receptor blockade on glycogenolysis during exercise.** A. C. Juhlin-Dannfelt, S. E. Terblanche, R. D. Fell, J. C. Young, and J. O. Holloszy (Washington University, St. Louis, MO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 549-554. 27 refs. Research supported by the Muscular Dystrophy Association and Swedish Society of Medical Sciences; Grant No. NIH-AM-18986.

The effects of beta-adrenergic receptor blockage on glycogen depletion is studied in rats during exercise. Results show that beta-adrenergic stimulation is not necessary for glycogen breakdown in skeletal muscle during prolonged exercise. Beta-adrenergic blockage does not inhibit liver glycogen depletion during exercise. In addition, it is found that the elevation of plasma free fatty acids partially inhibits the exercise induced decrease in glycogen concentration in the heart, and when elevation of free fatty acids and beta-blockage are combined, depletion of cardiac glycogen is almost completely prevented. Beta-blockage markedly reduces glycogen depletion in the heart during exercise. It is concluded that beta-adrenergic stimulation is of major importance in mediating glycogenolysis in the heart but is not necessary for glycogenolysis in skeletal muscle or liver during prolonged exercise. N.B.

**A82-44134** **Temperature effects on lung mechanics in air- and liquid-filled rabbit lungs.** H. Inoue, C. Inoue, and J. Hildebrandt (Virginia Mason Research Center, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 567-575. 26 refs. Grant No. NIH-HL-14854.

The effects of temperature on lung pressure-volume curves and on the reversibility of changes in the lung tissues are studied in rabbit lungs in the temperature range 4-52 C. Air curves are obtained at 21 C, then at one of seven test temperatures (4, 21, 32, 37, 42, 47, and 52 C) after 60 minutes equilibrium, and finally again at 21 C. Peak inflation volume is made identical at all temperatures in a given lung. Results show that warming diminishes elastic recoil in air-filled lungs, but above 42 C a slight increase occurs, probably reflecting the transition zone of pure dipalmitoyl phosphatidylcholine. Liquid filled lungs also demonstrate considerable temperature dependency, but no transitions. In addition, all surface and tissue changes up to 47 C are found to be reversible, but those at 52 are not. N.B.

**A82-44135** **Hemodynamic response to converting enzyme inhibition at rest and exercise in humans.** R. Fagard, P. Lijnen, L. Vanhees, and A. Amery (Leuven, Katholieke Universiteit, Louvain, Belgium). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 576-581. 33 refs. Research supported by the Instituut voor Wetenschappelijk Onderzoek of Belgium and Nationaal Fonds voor Wetenschappelijk Onderzoek.

The hemodynamic effects of Captopril is studied in six normal sodium-replete male subjects at rest and during exercise, together with the effects of the drug on the exercise capacity for graded uninterrupted exercise. Results show that the renin-angiotensin system is not involved in the homeostasis of blood pressure in supine sodium-replete humans, but has a modest role in blood pressure regulation when posture is changed from supine to upright. In addition, the orthostatic effect of Captopril is found to be maintained during upright exercise, and the reduction of systemic vascular resistance by Captopril does not affect peak oxygen uptake. N.B.

**A82-44136** **Aortic body chemoreceptor responses to dopamine, haloperidol, and pargyline.** N. J. Smatresk and S. Lahiri (Pennsylvania, University, Philadelphia, PA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 596-602. 33 refs. Grant No. NIH-HL-19737-05.

The effect of exogenously administered dopamine (DA) and a dopaminergic blocker, haloperidol, on aortic chemoreceptor activity, from single or few-fiber afferent nerve preparations, is studied in 18 anesthetized cats. Results show that exogenously administered DA has an inhibitory effect on the aortic body chemoreceptors that is qualitatively similar to that seen in the carotid body. In addition, the endogenous release of DA is found to increase as the arterial partial pressure levels fall, as judged by DA antagonism with haloperidol. Exogenous DA produces an inhibition that appears to interact with arterial oxygen levels in a complex fashion for unknown reasons. No physiologically significant role in the degradation of endogenous DA at aortic body receptor sites is found to be played by monoamine oxidase. N.B.

**A82-44137** **Hormone response of normal and intermittent cold-preadapted humans to continuous cold.** M. W. Radomski and C. Boutelier (Institute of Environmental Medicine, Downsview, Ontario; Toronto, University, Toronto, Canada; Centre d'Essais en Vol, Laboratoire de Medécine Aerospatiale, Bretigny-sur-Ogre, Essonne, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 610-616. 30 refs.

The hormonal and thermal responses of two groups of subjects were studied during 16 days in the Arctic (mean temperature -26.8 C), with one group (NPA) having received no prior cold exposure, while the other group (PA) was subjected to nine daily immersions (20-40 min) in cold water (15 C) for 20 days before the Arctic exposure. It was found that the NPA group showed an increase in metabolism and rectal temperature, while the PA group showed no elevation in metabolism and a decrease in rectal temperature. For the NPA group, Arctic exposure led to significant daily increases over the control period of urine volume, urinary norepinephrine, epinephrine, and 17-hydroxycoricosteroids, while only epinephrine increased in the PA group. It is concluded that the hormonal and thermal responses of the NPA group in the Arctic were characteristic of metabolic adaptation, whereas those in the PA group were suggestive of a hypothermic type of adaptation or habituation with no evidence of sympathetic or adrenocortical stimulation. N.B.

**A82-44138** **Hypoxic pulmonary vasoconstriction and the size of hypoxic compartment.** M. A. Zasslow, J. L. Benumof, and F. R. Trousdale (California, University, La Jolla, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 626-630. 24 refs. Research supported by the University of California.

The relationship between the amount of hypoxic pulmonary vasoconstriction (HPV) and the size of the hypoxic test segment (TS) is studied in pentobarbital sodium-anesthetized mongrel dogs. Results show that as the percent of the cardiac output perfusing the TS increases, the expression of HPV changes from flow redistribution to perfusion pressure increase, but the overall magnitude of HPV does not change. In addition, at any given percentage of the cardiac output perfusing the TS, the limits of any given individual HPV response are wide. N.B.

**A82-44139** **Effect of exercise conditioning on coronary resistance.** I. Y. S. Liang and H. L. Stone (Oklahoma, University, Health Sciences Center, Oklahoma City, OK). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 631-636. 19 refs. Grants No. NIH-HL-22154; No. NIH-HL-07430.

The diastolic coronary resistance (DCR) is measured in seven conscious dogs in the untrained state and after 4-6 weeks of daily exercise conditioning (partial training) in order to determine if daily exercise leading to a reduction in the coronary reactive hyperemic response produces any change in the DCR when myocardial oxygen demand is increased by atrial pacing. Also, the mechanism for any change in the DCR with atrial pacing is examined following adrenergic receptor blockage. Significant changes are found in the coronary flow, coronary resistance, and the reactive hyperemic response in partially trained animals. In addition, the evidence indicates a structural alteration in the vascular bed itself, possibly a change in the vessel caliber. N.B.

**A82-44140** **Factors inducing periodic breathing in humans - A general model.** M. C. K. Khoo, R. E. Kronauer, K. P. Strohl, and A. S. Slutsky (Harvard University, Cambridge; U.S. Veterans Administration Hospital, West Roxbury; Women's Hospital, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 644-659. 39 refs. Research supported by the Medical Research Council of Canada and U.S. Veterans Administration; Grant No. NIH-HL-16325-05.

A general model is developed to account for all kinds of periodic breathing (PB) resulting from instability in respiratory control: in normals during sleep and on acute exposure to high altitude, in sleeping infants, and in patients with cardiovascular or neurologic lesions. It is found that in almost every case the ventilatory oscillation is mediated predominantly by the peripheral controller. System stability is decreased by hypoxia, hypercapnia, increased lung washout times, prolonged lung-chemoreceptor delays, and high controller sensitivity. Stability is enhanced by large lung CO2 and O2 storage volumes but little affected by body tissue stores. Using our own measurements of lung-ear delays, the model predicts that the mean cycle time of PB decreases from about 30 s at sea level to 20 s at 14,000 ft, in excellent agreement with data from other studies. Allometric scaling of the relevant parameters also shows close agreement between model predictions and data obtained in infants. (Author)

**A82-44141** **A critical value for O2 transport in the rat.** R. P. Adams, L. A. Dieleman, and S. M. Cain (Alabama, University, Birmingham, AL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 660-664. 8 refs. Research supported by the Stichting De Drie Lichten of Netherlands; Grants No. NIH-HL-14693; No. NIH-HL-26927.

Intact anesthetized rats are ventilated under hypoxic, normoxic, and hyperoxic conditions while either normovolemic or hypovolemic, and the point at which the whole-animal skeletal muscle oxygen uptake becomes dependent on total oxygen transport (TOT) is determined. By so doing, a wide range of TOT values both above and below the range normally observed are obtained, and a critical value of TOT can be identified with respect to whole-body skeletal muscle oxygen uptake. No dependence of whole-body skeletal muscle oxygen uptake is found in the range of transport from approximately 23-80 ml/kg-min in anesthetized rats. Only below that range does the skeletal muscle oxygen uptake become dependent on transport. It is concluded that skeletal muscle oxygen uptake in the rat, as in the dog and other larger animals, is not normally transport limited during normoxic or hyperoxic conditions. N.B.

**A82-44142** **Modification of training-induced responses by repeated norepinephrine injections in rats.** M. Harri, P. Kuusela, and R. Oksanen-Rossi (Kuopio, University, Kuopio, Finland). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 665-670. 28 refs. Ministry of Education of Finland *Grants No. 9040/78/79;* No. 9449/78/80.

The effect of increased sympathetic influence, produced by repeated injections of norepinephrine, during exercises on the development of exercise-induced adaptive changes in rats is investigated. Results showed that the training specific changes (increased activity of oxidative muscle enzymes) were not potentiated by training under the influence of exogenous norepinephrine administration. While norepinephrine injections alone produced hypertrophy of the brown adipose tissue and increased colonic temperature response to isoproterenol, these changes failed to develop if the rats underwent physical training in addition to drug treatment. Norepinephrine treatment produced lower tail skin temperatures in a cool environment (15 C) with or without simultaneous training. It is concluded that the chronic norepinephrine treatment and physical training combination led to complex adaptive changes that could not be systematically associated with either norepinephrine treatment or physical training alone. N.B.

**A82-44143** **Hyperoxia inhibits stimulated superoxide release by rat alveolar macrophages.** H. J. Forman, J. J. Williams, J. Nelson, R. P. Daniele, and A. B. Fisher (Pennsylvania, University, Philadelphia, PA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 686-689. 26 refs. Grants No. NIH-HL-15061; No. NIH-HL-23790.

**A82-44144** **Regulation of glycogenolysis in human muscle at rest and during exercise.** D. Chasiotis, K. Sahlin, and E. Hultman (Huddinge University Hospital, Huddinge, Sweden). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 708-715. 37 refs. Research supported by the Medicinska Forskningsradet and Swedish National Association Against Rheumatism. MF Project 2647.

The mechanism for the increased glycogenolysis during exercise is studied in human muscle by measuring the activities of phosphorylase and synthase as well as the concentration of the activators AMP, IMP, and inorganic phosphate. Results show that the total glycogen phosphorylase and synthase activities are unchanged during exercise, while the activity of phosphorylase a at rest is low and critically dependent on the concentration of inorganic phosphate in the muscle. Phosphorylase a is found to increase initially 2.4 fold during isometric contraction and 1.6 fold during maximal bicycle exercise, but reverts to or below the resting value at fatigue/exhaustion. Synthetase I comprises 17-48% of the total activity at rest, but decreases during exercise to about half of this value. The reciprocal changes in phosphorylase and synthase are found to be correlated with the enhanced rate of glycogenolysis during exercise. It is concluded that the concentration of inorganic phosphate is one of the main factors determining phosphorylase activity and provides a link between phosphocreatine breakdown and glycogen utilization in muscle. N.B.

**A82-44145** **Protein kinase activity in liver of heat-acclimated hamsters.** R. Chayoth, M. Aharon, and Y. Graziani (Negev, University, Beersheva, Israel). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 716-718. 28 refs.

Protein kinase activity, potential changes in the activities of phosphorylase kinase and phosphorylase a during heat acclimation, and the cAMP dependence of protein kinases are investigated in liver slices from heat acclimated (35 C) and control (23 C) hamsters. Results show that the protein kinase activity in heat acclimated (HA) hamsters is 70% higher than in similar slices from control (C) hamsters, while adding glucagon to the incubation medium increased protein kinase activity by 65% for C animals but by only 30% for HA animals. The binding of tritium-labelled cAMP to proteins of a low-speed supernatant fraction of incubated and homogenized slices is 30% lower for HA than for C animals, while the addition of glucagon decreased the binding by 30% for each group. The activities of phosphorylase kinase, phosphorylase phosphatase, and phosphorylase a incubated with or without glucagon does not differ between groups. It is concluded that heat acclimation of the hamster increases the amount of a species of liver protein kinase that is different from the one that mediates the effect of glucagon on glycogenolysis. N.B.

**A82-44146** **Effect of heat stress on cutaneous vascular responses to the initiation of exercise.** J. M. Johnson and M. K. Park (Texas, University, Health Science Center, San Antonio, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Sept. 1982, p. 744-749. 29 refs. Grant No. NIH-HL-20663.

The competition between the vasoconstrictor and vasodilator reflexes in the regulation of skin blood flow is studied by investigating the responses in the forearm blood flow (FBF) to the initiation of supine leg exercises as determined by plethysmography against a background of rising internal temperature. Results show that FBF falls significantly with the beginning of each period of exercise, and the amount by which FBF falls increases with increasing levels of preexercise FBF. It was determined that these responses are not due to changes in internal temperature as reflected by esophageal temperatures, although individual studies occasionally showed a reduction or abolition of the vasoconstrictor response with the last period of exercise. It is concluded that these findings are in agreement with earlier studies showing a cutaneous participation in the vasoconstrictor responses to exercise, but they also indicate that sufficient hyperthermia can attenuate or even abolish this response. N.B.

**A82-44290** **Dynamic preload as an impact protection concept.** J. H. Raddin, Jr. (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) and B. F. Hearon (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). *SAFE Journal*, vol. 12, Fall 1982, p. 5-10. 5 refs.

Results of matched human impact exposures on a decelerator (with a preload of about 0.3 G) and an accelerator (with no preload) are presented, showing that the forces imposed on human subjects in impacts preceded by even a minimal dynamic preload were decreased in comparison to those in which the dynamic preload is zero. In tests with sled accelerations of 8 and 10 G's, head acceleration was 47 and 31 percent higher respectively for impacts without preload than for those with it, and the head severity index was up 86 and 56 percent. Statistically significant increases in resultant strap loads, lap belt loads and seat pan loads were also observed. So means should be sought to intentionally impose preload as a protective technique in impact exposures. A.B.

**A82-44292** **Head cooling and heat.** D. C. Reader, S. A. Nunneley, and R. J. Maldonado (USAF, School of Aerospace Medicine, Brooks AFB, TX). *SAFE Journal*, vol. 12, Fall 1982, p. 18-22.

The effects of head and body cooling during hyperthermia were investigated to determine whether head cooling alone would overcome some of the problems of heat stress. Measurements of body temperature, heart rate, psychomotor performance and subjective comfort were made during cycles of head and body heating and cooling. Heart rates were highest with head and body heating, less with head cooling, and lowest with head and body cooling. Decreased reaction time and increased errors occurred during head and body heating, but head cooling returned performance to near control levels. While head cooling is not a substitute for full body cooling or cabin conditioning, it may be a useful alternative for reducing the effects of heat stress on aircrew performance. A.B.

**A82-44450 *** **Polyamines and plant stress - Activation of putrescine biosynthesis by osmotic shock.** H. E. Flores and A. W. Galston (Yale University, New Haven, CT). *Science*, vol. 217, Sept. 24, 1982, p. 1259-1261. 23 refs. Research supported by the Binational Agricultural Research and Development Foundation and NASA.

The putrescine content of oat leaf cells and protoplasts increases up to 60-fold within 6 hours of exposure to osmotic stress (0.4 to 0.6 molar sorbitol). Barley, corn, wheat, and wild oat leaves show a similar response. Increased arginine decarboxylase activity parallels the rise in putrescine, whereas ornithine decarboxylase remains unchanged. DL-alpha-Difluoromethylarginine, a specific irreversible inhibitor of arginine decarboxylase, prevents the stress-induced rise in increase in arginine decarboxylase activity and putrescine synthesis, indicating the preferential activation of this pathway. (Author)

**A82-44512 *** **Design and evaluation of an onboard computer-based information system for aircraft.** S. H. Rouse, W. B. Rouse, and J. M. Hammer (Georgia Institute of Technology, Atlanta, GA). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, July-Aug. 1982, p. 451-463. 18 refs. Grant No. NsG-2119.

Information seeking by human operators of technical systems is considered. Types of information and forms of presentation are discussed and important issues reviewed. This broad discussion provides a framework within which flight management is considered. The design of an onboard computer-based information system for aircraft is discussed. The aiding possibilities of a computer-based system are emphasized. Results of an experimental evaluation of a prototype system are presented. It is concluded that a computer-based information system can substantially lessen the frequency of human errors. (Author)

**A82-44513** **Information automation and the Apollo program - A retrospective.** J. G. Wohl (Alphatech, Inc., Burlington, MA). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, July-Aug. 1982, p. 469-479. 19 refs.

The information revolution currently in progress is raising concerns about introducing computers and automation into peoples' lives. A review is in this connection presented of the problems and techniques associated with introducing computers into the prelaunch test and checkout activities of the Apollo Manned Lunar Landing program. This review has been provided in retrospective in the hope that some of the principles and concepts in an earlier and highly successful program will find an application to the not-so-different world of today and tomorrow. The examples demonstrate that a computer can be used to serve human needs for real-time information management, processing, and display in ways which keep people very much 'in-the-loop'. The methods described were specifically designed to compensate for normal human limitations in attention allocation, short-term memory, and information processing rate, and to exploit human ability to recognize unusual or unprogrammed events. G.R.

**A82-44514** **A finite-state description of coordination in a two-handed target acquisition task.** R. A. Miller, R. J. Jagacinski, W. W. Johnson (Ohio State University, Columbus, OH), and R. B. Nalavade (Rochester Institute of Technology, Rochester, NY). *(Human Factors Society, Annual Meeting, 25th, Rochester, NY, Oct. 12-16, 1981.) IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-12, July-Aug. 1982, p. 529-538. 19 refs. Grant No. AF-AFOSR-78-3697.

A position control stick with one hand and a velocity control stick with the other hand were manipulated in order to capture a moving target displayed on an oscilloscope screen. The two control sticks were additively coupled. In order to understand the coordination of the two control sticks, event-based first-order Markov 'activity sequence generators' were constructed for individual subjects. These discrete probabilistic structures are closely related to each subject's overall plan or general strategy for the capture task. Striking individual differences and strategic errors in performance were revealed. When combined with additional time-conditioned (open-loop) and error-conditioned (closed-loop) details, the activity sequence generators provide a basis for a hierarchic description of this perceptual-motor skill. (Author)

**A82-44658 #** **Regenerable life support for the space station - A technology status summary.** T. W. Herrala and G. N. Kleiner (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-45.* 8 p.

Regenerable environmental control and life support (ECLS) subsystems for use with STS are reviewed along with the candidate technologies currently being considered. Water processing and management is able to provide a major savings in launch weight for extended missions; vapor compression distillation and thermoelectrically integrated membrane evaporation are the major approaches being developed, and both are in the preprototype phase. Carbon dioxide removal and collection is possible using a molecular sieve, solid amine desorbtion, or an electrochemical concentrator, and the molecular sieve method has been flight qualified already. Sabatier, Bosch, and solid electrolyte processes are being considered for carbon dioxide reduction. A number of electrolysis methods are possible for maintaining the oxygen supply which employ different vapor or liquid water sources. Other subsystems for which the technology has been flight qualified include cabin ventilation and temperature control, heat transport, and extravehicular activity support. A.B.

**A82-44684 #** **Medical monitoring and therapy of space motion sickness.** K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) and C. M. Oman (MIT, Cambridge, MA). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-169.* 7 p. 46 refs.

The nature of motion sickness in space, its monitoring and treatment are reviewed. While the signs of motion sickness are malaise, pallor, cold sweating, nausea, and vomiting, the monitoring of this sickness in space has been largely confined to reports from astronauts. Techniques for the electric monitoring of pallor and cold sweating have been developed for experimental studies of motion sickness on earth, and similar equipment for monitoring these responses are being developed for applications in space. Also discussed are the special training plans proposed for astronauts before the early Spacelab missions in order to enable careful self-monitoring of certain autonomic phenomena by biofeedback. Therapy includes preflight habituation and drug selection, and in space, drugs, immobility, and time are used. N.B.

**A82-44685 #** **Habitability support for manned missions of space 2000.** G. L. Murphy (McDonnell Douglas Astronautics Co., Huntington Beach, CA). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-170.* 9 p. 6 refs.

The need to emphasize habitability in the design of future manned space vehicles is stressed as a means of enhancing productivity, motivation, crew morale, and acceptance of longer space stay times and shorter earth stay times between flights. Aspects which must be considered include longer mission duration and diverse crew composition (a factor which requires psychological, social, and cultural considerations). In addition, specific personal needs are mentioned, such as privacy, recreation, cleanliness and grooming, and separation of work and leisure time. Habitability data have been collected based on long-term space flights, ground confinement studies, comparative literature, and research by specialists. Data show the need for specification of zero-g posture, the most effective means of locomotion, and the most satisfying off-duty activity (looking out the window). In order to develop a habitable environment, it is suggested that a data base be established, and that engineering design data and techniques for evaluating habitats be developed. R.K.R.

**A82-44686 #** **Psychophysiological performance examination onboard the orbital complex Salyut-Soyuz.** J. Hideg, L. Bogner, P. Remes (Hungarian Academy of Sciences, Intercosmos Council, Budapest, Hungary), O. P. Kozarenko, V. I. Miasnikov, and I. P. Ponomareva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-171.* 6 p. 9 refs.

Studies of the psychic performance of three aircrews aboard the orbital station Salyut-6, measured by an instrument called the Belatron, are reviewed. The results of these studies show that the speed of information processing decreases in the case of cosmonauts flying for the first time, and the emotional tension significantly increases at the very beginning of the adaptation to weightlessness, while these responses are less pronounced in the case of experienced cosmonauts. The sensory-motor reaction time and the four-choice reaction time notably lengthen and the information processing ability decreases at the beginning of the postflight period. The indices of the psychic work capacity quickly return to normal after the flight, and the emotional tension level becomes stable within five days. N.B.

**A82-44687 * #** **Medical support and technology for long-duration space missions.** S. Furukawa (McDonnell Douglas Technical Services Co., Inc., Cocoa Beach, FL), A. Nicogossian (NASA, Washington, DC), P. Buchanan (NASA, Kennedy Space Center, Cocoa Beach, FL), and S. L. Pool (NASA, Johnson Space Center, Houston, TX). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-174.* 9 p. 6 refs.

The current philosophy and development directions being taken towards realization of medical systems for use on board space stations are discussed. Data was gained on the performance of physical examinations, venipuncture and blood flow, blood smear and staining, white blood cell differential count, throat culture swab and colony count, and microscopy techniques during a 28-day period of the Skylab mission. It is expected that the advent of Shuttle flights will rapidly increase the number of persons in space, create a demand for in-space rather than on-earth medical procedures, and necessitate treatments for disorders without the provision for an early return to earth. Attention is being given to pressurized environment and extravehicular conditions of treatment, the possibilities of the use of the OTV for moving injured or ill crewmembers to other space stations, and to isolation of persons with communicable diseases from station crews. M.S.K.

**A82-44688 #** **Catecholamines and their enzymes in discrete brain areas of rats after space flight on biosatellites Cosmos.** R. Kvetnansky, J. Culman, T. Torda, L. Macho (Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia), L. V. Serova, and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-180* 8 p. 33 refs.

The influence of stressful factors and of long periods of weightlessness on the activity of the catecholaminergic system in the brains of rats is investigated during 18.5-19.5 day flights on Cosmos biosatellites. In two experiments, the concentration of norepinephrine and the activities of tyrosin hydroxylase, dopamine-beta-hydroxylase, and monamine oxidase were measured in the total hypothalamus, and were found not to have changed after space flight. In a subsequent experiment, the concentrations of norepinephrine, epinephrine, and dopamine were studied in isolated nuclei of the hypothalamus of rats within 6 to 10 hours following the return from space. It was found that norepinephrine was significantly reduced in the arcuate nucleus, median eminence, and periventricular nucleus, and epinephrine was reduced in the median eminence, and in the periventricular and suprachiasmatic nuclei, whereas dopamine was not significantly changed after space flight. It was concluded that the decreased catecholamine levels indicate that no chronic intensive stress factors acted during the flights, and that this decrease was induced by the effect of a stressogenic factor acting for a short time only, most likely during or immediately after landing. N.B.

**A82-44689 #** **The first joint Franco-Soviet manned flight - The posture experiment (Premier vol habité Franco-Soviétique - L'expérience posture).** F. Lestienne, G. Clément (CNRS, Laboratoire de Physiologie Neurosensorielle, Paris, France), V. Gurfinkel (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR), R. Capraro (Centre National d'Etudes Spatiales, Toulouse, France), V. Kojarinov, A. Lepsky (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), and J. L. Lafon (Société Bertin et Cie., Plaisir, Yvelines, France). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-183.* 7 p. 14 refs. In French.

The apparatus, procedures, and results of the posture experiment to test the sensorimotor interactions linked to postural control in weightless conditions on board the Salyut 7 space station during a seven-day mission are reported. The experiment comprised observation of postural adjustments enacted during elevation of the arms in conditions of varying visual limits and mechanical stresses. Specific attention was given to reflex activities of postural muscles, any increase in visual dependence, and persistence of motor programs. The subject stood on a platform and, at the sound of a signal, moved his arms towards a target, sometimes carrying a 1-kg mass. Trials were performed which involved the wearing of glasses which blocked the total vision, the peripheral vision, or permitted tunnel vision. Monitoring was carried out for muscle rigidity, leg muscle myographic signals, angle of the feet, speed of arm movement, stability of the feet, and arm used, and 16 mm movies were made. The soleus muscle was found to equally activate during weighted and nonweighted movements, and peripheral vision was found to be prominent in postural control. M.S.K.

**A82-44690 #** **Possible adaptation to strong magnetic fields.** Z. N. Nakhimitskaia, L. D. Klimovskaia, Z. F. Kuzmina, V. M. Mastriukova, N. P. Smirnova, A. D. Strzhizhovskii, and G. V. Cherkasov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-188.* 4 p. 5 refs.

Animal adaptation to a strong magnetic field was investigated. Mice were exposed to 30-day total-body continuous effects of a constant magnetic field

(CMF) of 1.6 T, and their physiological responses were assessed. Analysis of the data obtained showed that different parameters varied in a dissimilar manner. Red blood changes returned to normal in the course of the experiment. Leucocytosis and increased content of catecholamines and corticosterone of blood and adrenals persisted throughout the exposure. Changes in the spermatogenic epithelium were most distinct after the exposure. The recovery of certain parameters during the CMF exposure is indicative of adaptation of some physiological systems. The adaptation is, however, incomplete as suggested by the long persisting stress manifestations. Reticulocytopenia and spermatogenetic abnormalities found after the exposure are of particular importance. Animal and human adaptation to strong magnetic fields is attracting greater attention of researchers in space biology and medicine in view of future space flights. The possibility of applying magnetic devices in space rocketry (magnetohydrodynamic engines, magnetic energy accumulators, strong magnets used in assembly operations in orbit, magnetic radiation protection systems) makes the magnetic protection of crewmembers one of the important problems of space medicine. (Author)

**A82-44708** # **Planetary atmospheres and the search for life.** T. Owen (New York, State University, Stony Brook, NY). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-268.* 23 p.

The search for life on other planets is considered through comparative studies of planetary atmospheres. It is suggested that planetary atmospheres are necessary for life, based on moon and Mars explorations, and water and carbon are considered to be the essential elements. Other atmospheric constituents such as methane, ammonia, and hydrogen sulfide are considered in terms of atmospheric origins. It is found that the atmospheric development process requires a solid surface in order to provide a place where chemicals can react after formation, implying that this is a necessary condition for the origin of life. Although these conditions are characteristic of other planetary bodies within our solar system, earth is the only body warm enough andof the right size to allow water to be liquid and to have acquired a large enough store of volatiles. Tables of atmospheric composition are included. R.K.R.

**A82-44823** **Absence of depth processing in the large-frame rod-and-frame effect.** S. M. Ebenholtz (Wisconsin, University, Madison, WI) and G. W. Glaser (Rhode Island School of Design, Providence, RI). *Perception and Psychophysics*, vol. 32, no. 2, Aug. 1982, p. 134-140. 21 refs. Grant No. NIH-EY-02264.

Attenuation of the rod-and-frame effect with depth separation was investigated with the rod and frame in either intersecting or parallel depth planes (PDP). In the former case, in which either the top of the rod or the frame was inclined 45 deg away from the observer, no attenuation was found for frames projecting a retinal angle of 39.2 or 13.5 deg. In the PDP paradigm, the rod was optically 60 cm nearer the observer than was the frame. The depth adjacency effect of Gogel and Newton (1975) was replicated, but only for small retinal angles (7.2 and 6.8 deg) of the frame and for a 15-deg frame tilt, but not for larger retinal angles (39.2 and 12.7 deg) or for frames tilted at 22 deg. The absence of attenuation with depth separation in large frames and its presence in small frames is consistent with the identification of these phenomena with properties of the ambient and focal visual systems, respectively. C.D.

**A82-44824** **Inhibition of the rod-and-frame effect by circular contours.** S. M. Ebenholtz and J. W. Utrie, Jr. (Wisconsin, University, Madison, WI). *Perception and Psychophysics*, vol. 32, no. 2, Aug. 1982, p. 199, 200. 12 refs.

The influence of a frame on orientation perception was studied. Twenty-four volunteers took part in a task whose aim was to adjust a luminous rod to the egocentric vertical. The rod rotated about an axis at the center of the tilted frame. Differences in the frame-present and frame-absent settings defined the rod-and-frame effect (RFE). Both high and low scorers were significantly influenced by the circumscribing patterns. It is found that the presence of the circular pattern around the frame inhibits the influence of the tilted frame on egocentric orientation. C.D.

# STAR ENTRIES

**N82-30833*#** Massachusetts Inst. of Tech., Cambridge.
**PROCEEDINGS OF THE SIXTEENTH ANNUAL CONFERENCE ON MANUAL CONTROL**
1980 643 p refs Conf. held at Cambridge, Mass., 5-7 May 1980 Sponsored by NASA. Ames Research Center
(NASA-CR-169243; NAS 1.26:169243) Avail: NTIS HC A99/MF A01 CSCL 05H

Operator modeling is reviewed. Measurement of human response is considered. Pilot/operator opinion is also considered. The effects of motion are reviewed. Aircraft displays are discussed. Supervisory control is considered. Automobile driving and remote manipulation are also considered. For individual titles, see N82-30834 through N82-30870.

**N82-30834*#** Illinois Univ., Chicago. Coll. of Engineering.
**MODELING OF HUMAN OPERATOR DYNAMICS IN SIMPLE MANUAL CONTROL UTILIZING TIME SERIES ANALYSIS**
Gyan C. Agarwal, Frank Osafo-Charles, William D. Oneill, and Gerald L. Gottlieb *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 1-28 refs Prepared in cooperation with Rush-Presbyterian-Saint Luke's Medical Center, Chicago, Ill.

(Grants NSF ENG-76-08754; NS-00196; NS-12877)
Avail: NTIS HC A99/MF A01 CSCL 05H

Time series analysis is applied to model human operator dynamics in pursuit and compensatory tracking modes. The normalized residual criterion is used as a one-step analytical tool to encompass the processes of identification, estimation, and diagnostic checking. A parameter constraining technique is introduced to develop more reliable models of human operator dynamics. The human operator is adquately modeled by a second order dynamic system both in pursuit and compensatory tracking modes. In comparing the data sampling rates, 100 msec between samples is adequate and is shown to provide better results than 200 msec sampling. The residual power spectrum and eigenvalue analysis show that the human operator is not a generator of periodic characteristics.
Author

**N82-30835*#** Systems Research Labs., Inc., Dayton, Ohio.
**A GUNNER MODEL FOR AN AAA TRACKING TASK WITH INTERRUPTED OBSERVATIONS**
C. F. Yu, K. C. Wei, and M. M. Vikmanis (Aerospace Medical Research Lab.) *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 29-39 refs

(Contract F33615-79-C-0500)
Avail: NTIS HC A99/MF A01 CSCL 05H

The problem of modeling a trained human operator's tracking performance in an anti-aircraft system under various display blanking conditions is discussed. The input to the gunner is the observable tracking error subjected to repeated interruptions (blanking). The effect of blanking on the gunner's tracking performance is modeled via the observer and controller gains.
Author

**N82-30836*#** Analytical Mechanics Associates, Inc., Mountain View, Calif.
**MODELING HUMAN TARGET ACQUISITION IN GROUND-TO-AIR WEAPON SYSTEMS**
A. V. Phatak, R. L. Mohr, M. M. Vikmanis (Aerospace Medical Research Lab.), and K. C. Wei (Systems Research Lab., Dayton Ohio) *In* MIT Proc. of the 16th Ann. Con. on Manual Control 1980 p 40-48 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Several models were developed for describing human operator input-output behavior in ground-to-air target tracking tasks. The problems associated with formulating and validating mathematical models for describing and predicting human target acquisition response are considered. The extension of the human observer model to include the acquisition phase as well as the tracking segment is presented. Relationship of the observer model structure to the more complex strandard optimal control model formulation and to the simpler transfer function/noise representation is discussed. Problems pertinent to structural identifiability and the form of the parameterization are elucidated. A systematic approach towards the identification of the observer acquisition model parameters from ensemble tracking error data is presented.
Author

**N82-30837*#** National Aerospace Lab., Amsterdam (Netherlands).
**THE EFFECT OF VISUAL INFORMATION ON THE MANUAL APPROACH AND LANDING**
P. H. Wewerinke *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 49-65 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The effect of visual approach and landing information in combination with basic display information on the approach performance is examined. A pre-experimental model analysis was performed in terms of the optimal control model. Aircraft approach performance predictions were compared with the results of a moving base simulator program.
Author

**N82-30839*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PURSUIT TRACKING AND HIGHER LEVELS OF SKILL DEVELOPMENT IN THE HUMAN PILOT**
Ronald A. Hess *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 92-105 refs

Avail: NTIS HC A99/MF A01 CSCL 05I

A model of the human pilot is offered for pursuit tracking tasks; it encompasses an existing model for compensatory tracking. The central hypothesis in the development of this model states that those primary structural elements in the compensatory model responsible for the pilot's equalization capabilities remain intact in the pursuit model. The sharp reduction in low-frequency phase lag beyond that associated with the disappearance of phase droop is seen to accompany relatively low-gain feedback of vehicle output. The results of some recent motion cue research are discussed and interpreted in terms of the compensatory-pursuit display dichotomy. Preview is shown to demand no fundmanetal changes in structure or equalization, and to allow the pilot to eliminate the effective time delays that accrue in the inversion of the controlled-element dynamics. Precognitive behavior is discussed and a model that encompasses all the levels of skill development outlined in the successive organizations of perception (SOP) theory is finally proposed.
Author

**N82-30841*#** Tokyo Univ. (Japan). Dept. of Aeronautics.
**AN EXPERIMENTAL STUDY OF HUMAN PILOT'S SCANNING BEHAVIOR**
Kyuichiro Washizu, Keiji Tanaka (National Aerospace Lab., Tokyo), and Tatsuo Osawa *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 128-133 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The scanning behavior and the control behavior of the pilot who manually controls the two-variable system, which is the most basic one of multi-variable system, which is the most basic one of multi-variable systems are investigated. Two control tasks, which simulate the actual airplane attitude and airspeed control are reported. In order to simulate the change of the situation where the pilot is placed, such as changes of flight phase, mission and others, the subject was requested to vary the wrightings, as his control strategy, upon each task. Changes of human control dynamics and his scanning properties caused by the modification of the situation were investigated.
Author

**N82-30842*#** Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Dept. of Human Factors Engineering and Simulation.

**PARAMETRIC IDENTIFICATION OF HUMAN OPERATOR MODELS**

Norbert R. Ninz *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 137-145 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The accurate and efficient identification of the human operator is still a need in human factors engineering especially concerning multivariable control. Control theoretic identification methods need to be tested with human operator models under realistic boundary conditions. The requirements and criteria for the use of parametric methods, selected models as well as the Maximum Likelihood Method and the Extended Kalman Filter are displayed. The experiments and results are comparatively discussed from the point of practical engineering. Author

**N82-30843*#** Georgia Inst. of Tech., Atlanta. Systems Engineering Lab.

**A COMPUTER SIMULATION APPROACH TO MEASUREMENT OF HUMAN CONTROL STRATEGY**

Joanne Green, Esther Lee Davenport, Harold F. Engler, and William E. Sears, III *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 146-171 refs

(Contract N00014-75-C-0432)

Avail: NTIS HC A99/MF A01 CSCL 05H

Human control strategy was measured through use of a psychologically based computer simulation which reflects a broader theory of control behavior. The simulation is called the human operator performance emulator (HOPE). HOPE was designed to emulate control learning in a one-dimensional preview tracking task and to measure control strategy in that setting. HOPE generates control stick behavior corresponding to that which might be used by a person learning preview tracking. Author

**N82-30844*#** Massachusetts Inst. of Tech., Cambridge.

**SUBJECTIVE SCALING OF MENTAL WORKLOAD IN A MULTI-TASK ENVIRONMENT**

Bahman Daryanian *In its* Proc. of the 16th Ann. Conf. on Manual Control 1980 p 172-188 refs

Avail: NTIS HC A99/MF A01 CSCL 05I

The results of a mental workload experiment which was carried out in a simulated multi-task environment are reported. The experiment developed and examined a method that would qualitatively and quantitatively identify those factors in a multi-task environment that contribute to the operators' sense of mental workload. Thurstone's law of comparative judgment was employed to construct in interval scales of subjective mental workload from paired comparisons data. L.F.M.

**N82-30845*#** San Jose State Univ., Calif.

**EFFECT OF COUNTING AND TRACKING ON VERBAL AND PRODUCTION METHODS OF TIME ESTIMATION**

Kathleen L. Bird and Sandra Hart *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 189-211 refs Prepared in cooperation with Tufts Univ., Medford, Mass.

(Contract NCC2-34; Grant NsG-2156)

Avail: NTIS HC A99/MF A01 CSCL 05I

The effects of time estimation technique and task condition on the production and verbal estimation of time intervals ranging from 5 to 14 sec were investigated. Sixteen male college students were randomly assigned to two groups, each of which utilized a different estimation method: (a) production; or (b) verbal estimation. The subjects were instructed either to produce or to give a verbal estimate of the duration of these time intervals during each task condition: (a) pretracking, (b) tracking (subject performed a one-axis tracking task), and (c) posttracking. Each subject used each of the two estimation techniques: (a) vocal counting and (b) no counting. The ratio of the subject's time estimate to actual interval length was computed for each trial. Productions were typically longer than verbal estimates of the same duration and produced durations were typically too long whereas verbal estimates were too short relative to the correct duration. A significant interaction was found between counting technique and tracking condition for both estimation methods. A significant effect could be attributed to the addition of a tracking task. Author

**N82-30846*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**A MODEL BASED TECHNIQUE FOR PREDICTING PILOT OPINION RATINGS FOR LARGE COMMERCIAL TRANSPORTS**

William H. Levison *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 216-242 refs

(Contract NAS1-15529)

Avail: NTIS HC A99/MF A01 CSCL 05I

A model-based technique for predicting pilot opinion ratings is described. Features of this procedure, which is based on the optimal-control model for pilot/vehicle systems, include: (1) capability to treat 'unconventional' aircraft dynamics, (2) a relatively free-form pilot model, (3) a simple scalar metric for attentional workload, and (4) a straightforward manner of proceeding from descriptions of the flight task environment and requirements to a prediction of pilot opinion rating. The method was able to provide a good match to a set of pilot opinion ratings obtained in a manner simulation study of large commercial aircraft in landing approach. Author

**N82-30847*#** National Aerospace Lab., Tokyo (Japan). Instrumentation and Control Div.

**AN ANALYTICAL PREDICTION OF PILOT RATINGS UTILIZING HUMAN PILOT MODEL**

Koji Tanaka and Kyuichiro Washizu *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 243-253 refs Prepared in cooperation with Tokyo Univ.

Avail: NTIS HC A99/MF A01 CSCL 05I

In order to analytically predict pilot ratings, an evaluation method of a manual control system which consists of an aircraft and a human pilot, is proposed and examined. The method is constructed upon the assumptions that the control mission determines the critical frequency the pilot should bring to his focus, and that the degree of closed-loop stability and the human compensation necessary to attain the stability determine the human subjective evaluation of the system. As a result, a simple evaluation chart is introduced. The chart enables us to predict the subjective evaluation, if the controlled element dynamics and the mission are given. The chart is in good accord with almost all of the existing results of pilot ratings. This method has the following four advantages: (1) Simplicity, in a sense that the method needs to evaluate only two typical controlled element parameters, namely, the gain slope and the phase at the critical control frequency; (2) Applicability to unstable controlled elements; (3) Predictability of controllability limits of manual control; (4) Possibility of estimating human compensatory dynamics. Author

**N82-30852*#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**A PERFORMANCE ANALYSIS STUDY OF A COMPLEX G FIELD EXPERIMENT**

D. W. Repperger *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 292-315 refs

Avail: NTIS HC A99/MF A01 CSCL 05S

A performance study was conducted on human tracking under a complex field. Three important points are illustrated. First it shows the connection between the phase plane boundary points and window measures through the use of cumulative distribution function (CDF) on the data. Secondly, the effects of stress on tracking performance manifests itself via the t tests across CDF's under two experimental conditions. It is shown for one subject and 4 replications that there exists a significant performance degradation due to stress. A third point made by this paper is that a K-S test on the distributions of the phase plane trajectories indicate the nonnormality of the empirical density functions. This statement can be made with greater than 98% confidence. It is interesting in this case to have such a result hold for a tracking task which is sum of sines and to contrast this result to the deterministic case considered. L.F.M.

**N82-30853*#** Systems Technology, Inc., Hawthorne, Calif.

**A SOFTWARE PACKAGE FOR EVALUATING THE TRANSMISSIBILITY BETWEEN VEHICLE VIBRATION AND MOTIONS OF HANDS (IN CONTROLS), LIMB, HEAD AND EYES**

Susan A. Riedel, Henry R. Jex, and Raymond E. Magdaleno *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980

p 317-339 refs
(Contract F33615-79-C-0519)
Avail: NTIS HC A99/MF A01 CSCL 06H

A user oriented computer program for exercising the 1980 version of the STI biodynamic model BIODYN-80 was completed. The user inputs some 80-100 variables describing the assumed posture, interface characteristics (e.g., stick feel), and vestibular characteristics. The computer calculates the transfer functions between vibration input and various selected outputs of interest to the user. Another option is to output the operator's torso-limb-neuromuscular loop transmissibilites as seen at the stick, as required for the AMRL/BBN PIVIS computer program for computing tracking performance effects of vibration. Applications to some current problems are demonstrated. Author

**N82-30854*#** Connecticut Univ., Storrs. Dept. of Electrical Engineering and Comouter Science.

### MODELING LATERAL ACCELERATION EFFECTS ON PILOT PERFORMANCE

Jonathan Korn and David L. Kleinman *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 340-348 refs

Avail: NTIS HC A99/MF A01 CSCL 06S

Attendant to the direct side force maneuver of a vectored force fighter is the transverse acceleration imposed on the pilot. This lateral acceleration (G sub y), when combined with a positive G sub z stress, is a potential source of pilot tracking performance impairment. Experimental and analytical modeling of pilot performance decrements using the optimal control model (OCM) is described. J.D.

**N82-30855*#** Systems Technology, Inc., Hawthorne, Calif.

### A COMPREHENSIVE SYSTEM MODEL FOR MOTION/SPACE SICKNESS: PRELIMINARY RESULTS

Susan A. Riedel *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 349-368 refs

(Contract NAS2-10430)
Avail: NTIS HC A99/MF A01 CSCL 06P

The observed facts of motion/space sickness are categorized and ordered into a rational structure for use in a comprehensive system model for motion/space sickness. An array of key facts, consisting of a collection of motion/space sickness observations assembled from the current literature which must be accounted for in the comprehensive model, is presented. A model structure responsive to the array of key facts and to the other requirements of a working research tool is presented. J.D.

**N82-30858*#** Dayton Univ., Ohio. Dept. of Aerospace Engineering.

### PILOT REACTION TO ATTITUDE GYRO FAILURE: A FLIGHT EXPERIMENT

Richard L. Newman and David L. Quam *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 410-421 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A flight experiment using a Cessna 172 airplane with the vacuum system modified to permit total failure of the attitude and directional gyros is described. Nine subject pilots, ranging in experience from 170 to 5100 hours, flew simulated (hooded) instrument missions with an unexpected gyro failure introduced at a critical point. All subjects, except for the 170 hour pilot, were instrument rated. (The 170 hour pilot was a private pilot working on his instrument rating). All of the subject pilots were able to maintain control of the airplane following the gyro failure. Only one subject exceeded the a priori criterion of losing a maximum of 250 feet of altitude. None of the subjects flew a satisfactory VOR approach following the failure: however, all would have found the airport safely given a ceiling of 1000 feet or better. J.D.

**N82-30861*#** Ohio State Univ., Columbus. Dept. of Industrial and Systems Engineering.

### COMBINED DISCRETE NETWORK CONTINUOUS CONTROL MODELLING OF OPERATOR BEHAVIOR

R. A. Miller and Deborah J. Seifert (AiResearch Manufacturing Co.) *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 448-464 refs

Avail: NTIS HC A99/MF A01 CSCL 05I

Systems in which an operator is faced with a continuous control task plus one or more discrete information processing tasks were investigated. A modeling approach which has the capability of realistically representing both types of tasks and the resulting interactions is described. The modeling approach utilizes discrete network models for the cognitive tasks and elements of an open loop/closed loop control representation for the continuous task. The approach is demonstrated through its application to a simulated digital avionics information system in which subjects were required to perform retrieval and processing tasks as well as flight control. This model differs from conventional models in that system status sampling is not necessarily continuous or periodic. Rather, the pilot is assumed to read system status displays only as time permits and operate in open loop preprogrammed fashion between sampling. J.D.

**N82-30862*#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.

### A MODEL OF HUMAN DECISION MAKING IN MULTIPLE PROCESS MONITORING SITUATIONS

Joel S. Greenstein and William B. Rouse (Illinois Univ., Urbana-Champaign) *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 465-487 refs

(Grant NsG-2119)
Avail: NTIS HC A99/MF A01 CSCL 05J

Human decision making in multiple process monitoring situations is considered. It is proposed that human decision making in many multiple process monitoring situations can be modeled in terms of the human's detection of process related events and his allocation of attention among processes once he feels events have occurred. A mathematical model of human event detection and attention allocation performance in multiple process monitoring situations is developed. An assumption made in developing the model is that, in attempting to detect events, the human generates estimates of the probabilities that events have occurred. An elementary pattern recognition technique, discriminant analysis, is used to model the human's generation of these probability estimates. The performance of the model is compared to that of four subjects in a multiple process monitoring situation requiring allocation of attention among processes. Author

**N82-30863*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

### PROCRU: A MODEL FOR ANALYZING FLIGHT CREW PROCEDURES IN APPROACH TO LANDING

S. Baron, G. Zacharias, R. Muralidharan, and R. Lancraft *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 488-520 refs
(Contract NAS2-10035)
Avail: NTIS HC A99/MF A01 CSCL 05H

The Procedure Oriented Crew Model (PROCRU) simulation model for examining crew procedures in approach to landing is described and the results of its operation illustrated. It models cognitive and perceptual motor activities including monitoring and information processing, flight control, decision making, execution of standard procedures, and communiations with other crew members and with air traffic control. a system model and a model for each crew member are included. The crew is composed of three members: pilot flying (PF), pilot not flying (PNF), and second officer (SO). The SO is modeled as a purely deterministic program that responds to events and generates requests. The PF and PNF are each represented by complex human operator models having information processing and decision making components. J.D.

**N82-30864*#** Systems Research Labs., Inc., Dayton, Ohio.

### APPLICATION OF OPTIMAL CONTROL PRINCIPLES TO DESCRIBE THE SUPERVISORY CONTROL BEHAVIOR OF AAA CREW MEMBERS

Chris Hale and George J. Valentino (Air Force Aerospace Medical Reseach Lab., Wright-Patterson AFB, Ohio) *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 523-532

Avail: NTIS HC A99/MF A01 CSCL 05J

Supervisory decision making and contol behavior within a C to the third power oriented, ground based weapon system was studied. The sequence of control strategies used during engagement of aircraft targets was empircally investigated. An engagement is conceptually divided into several stages which include initial information processing activity, tracking, and ongoing adaptive control decisions. Model parameters are described and two experiments which served as initial investigation into the accuracy of assumptions on the importance of situation assessment in procedure selection are outlined. The validity of the assumptions on strategic information processing and cue criterion relationship learning is upheld. It is indicated that the model structure is useful in studies of supervisory decision behavior. E.A.K.

**N82-30867*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.

### THE ROLE OF ANTAGONIST COACTIVATION IN THE CONTROL OF NATURAL MOVEMENT

Neville Hogan *In its* Proc. of the 16th Ann. Conf. on Manual Control 1980 p 571-583 refs

(Grant NSF PFR-79-17348)
Avail: NTIS HC A99/MF A01 CSCL 06P

The control of the impedance about the joints of the natural musculoskeletal system by coactivation of antagonist muscle groups is described. The consequences of the ability to control joint impedance are discussed. An explanation of the crucial role played by two joint muscles in the control of natural movement is proposed. The implications for the control manipulators and the modeling of the human operator are discussed. E.A.K.

**N82-30868*#** Massachusetts Inst. of Tech., Cambridge.

### A COMPARISON OF CONTROL MODES FOR TIME-DELAYED REMOTE MANIPULATION

Gregory P. Starr *In its* Proc. of the 16th Ann. Conf. on Manual Control 1980 p 584-592 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Transmission time delay in the communication channel of a manual control system which degrades performance by preventing the human operator from immediately seeing the results of his actions is discussed. A time delay exists in remote manipulation systems, caused by long communication distances or bandwidth limitations. It is suggested tha because of the difficulty of effectively using the move and wait strategy with a master slave manipulator -rate control is a more effective control mode with time delay. Manipulator rate controllers are usually multiaxis joysticks or switchboxes and are constructed so that the manipulator can be held stationary. The hand is removed from the controller which eliminates the possibility of undesired manipulator motion and should aid in the use of the move and wait strategy. Master slave and rate control of a manipulator are compared. Four time delays are used. These delays allow the examination of the effect of time delay on control mode performance. A peg transfer task used, with automated dated acquisition. E.A.K.

**N82-30869*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena. Robotics and Teleoperator Group.

### EXPERIMENTAL EVALUATION OF THE CONCEPT OF SUPERVISORY MANIPULATION

T. L. Brooks and T. B. Sheridan (MIT) *In* MIT Proc. of the 16th Ann. Conf. on Manual Control 1980 p 593-606 refs

(Contracts NAS7-100; N00014-77-C-0256)
Avail: NTIS HC A99/MF A01 CSCL 05H

A computer controlled teleoperator system which is based on task referenced sensor aided control to study supervisory manipulation was developed. This SUPERMAN system, performs complicated tasks in real time by utilizing the operator for high level functions related to the unpredictable, portions of a task, while the subordinate machine performs the more well defined subtasks under human supervision. Supervisoy control schemes were compared with manual control under real time conditions. Six representative tasks were performed under simulated conditions using four forms of manual control, as well as suprvisory control. The effectiveness and quality of control were evaluated on the basis of the time required to complete each portion of the task and the type and number of errors which occurred. It is found that supervisory control improves performance for all forms of manual control except force reflecting master-slave which is slightly faster than supervisory control, but more prone to errors. E.A.K.

**N82-30870*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### EVALUATION OF SMART SENSOR DISPLAYS FOR MULTIDIMENSIONAL PRECISION CONTROL OF SPACE SHUTTLE REMOTE MANIPULATOR

A. K. Bejczy, J. W. Brown (JPL, Calif. Inst. of Tech., Pasadena), and J. L. Lewis *In* MIT Proc. of 16th Ann. Conf. on Manual Control 1980 p 607-627 refs

(Contract NAS7-100)
Avail: NTIS HC A99/MF A01 CSCL 05H

An enhanced proximity sensor and display system was developed and tested on the full scale Space Shuttle remote manipulator. The sensor system, integrated with a four claw end effector, measures range error up to 6 inches, and pitch and yaw alignment errors within + or - 15 deg., and displays error data on both graphic and numeric displays. The errors are referenced to the end effector control axes through appropriate data processing by a microcomputer acting on the sensor data in real time. Methods to minimize terminal range and alignment errors by utilizing range, pitch and yaw error information from the sensor displays were investigated. The test runs aided by sensor displays are contrasted with test runs without sensor display aids. The enhanced sensor and display system, the test runs and results are described. It is indicated that the use of graphic/numeric displays of proximity sensor information improves precision control of grasp/capture range by more than a factor of two for both static and dynamic grapple conditions. E.A.K.

**N82-30871*#** National Aeronautics and Space Administration, Washington, D. C.

### EFFECT OF RESTRICTED MOBILITY ON THE COMPOSITION AND METABOLISM OF BLOOD LIPOPROTEIDS IN RABBITS

P. P. Chayalo and T. A. Kirlyenko Apr. 1982 13 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (USSR), v. 52, no. 3, 1980 p 359-364 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76846; NAS 1.15:76846) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

The content of total cholesterol and triacylglycerols in the blood increases in rabbits, subjected to conditions of restricted mobility for a period of two months, because of the increase in the content in the composition of lipoproteids of very low and low density. After intravenous administration of lipoproteids of very low density, which contain H3 cholesterol, the slowing of their dissociation was observed with hypokinesia. The metabolism of lipoproteids of low and high density is also slowed under these conditions while the activity of lipoproteidlipase in the blood plasma decreases. S.L.

**N82-30872*#** National Aeronautics and Space Administration, Washington, D. C.

### REGIONAL REDISTRIBUTIONS OF THE BLOOD IN BLOOD LOSS AND MECHANICAL TRAUMA AGAINST THE BACKGROUND OF VARIOUS FUNCTIONAL STATES OF THE BODY

O. A. Kovalev, V. K. Kulagin, and B. I. Krivoruchko Jun. 1982 15 p refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 4, 1979 p 27-34 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76880; NAS 1.15:76880) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Loss of 20-40% of circulating blood volume in immobilized rats subjected to shock by Kennon's method with either short term fixation of controls or 7 day hypokinesia was investigated. Phases of shock caused by compression of soft tissues and of irreversible shock caused by Kennon's method are described. Regional and after 7 day hypokinesia were studied. Shifts in the relative content of blood in organs and tissues and their relation to pathophysiology resulting from blood loss or mechanical trauma are discussed. Regional redistributions of blood may be caused by various factors such as stress, excitation and hemostasis. Characteristic sequential stages of regional blood redistribution are noted during the progression of the physiological reaction to extreme external effects. E.A.K.

**N82-30873*#** National Aeronautics and Space Administration, Washington, D. C.

### THE INTERACTION OF PURKINJE CELLS, CAPILLARIES AND GLIA IN THE CEREBELLAR CORTEX OF NORMAL

### AND HYPOKINETIC CATS

R. P. Kotskovich Jun. 1982 13 p refs Transl. into ENGLISH from Biol. Nauk. (USSR), no. 3, 1981 p 50-54 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76882; NAS 1.15:76882) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

The interaction of Purkinje cells, capillaries and glicocytes in the cerebral cortex of normal and hypokinetic cats was studied. It is demonstrated that prolonged hypokinesia does not cause significant changes in the structure of Purkinje cells. It is found that morphological changes in the capillaries take place, which leads to a reduction in the vascular microbasin in the nerve cells. E.A.K.

**N82-30874***# National Aeronautics and Space Administration, Washington, D. C.

### INFLUENCE OF HYPOKINESIA ON THE CONTENT OF ELECTROLYTES IN ANIMAL ORGANS

G. D. Reushkina, V. N. Reushkina, and N. P. Rostyakov May 1982 4 p Transl. into ENGLISH from Patol. Fiziol. ekap. Ter. (USSR), no. 2, Mar. - Apr. 1981 p 92 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76899; NAS 1.15:76899) Avail: Issuing Activity CSCL 06C

In 60 day controlled tests of hypokinesia of 35 rabbits, significant reduction in potassium, sodium and chlorine concentration in the myocardium and hypothalamus and slight reductions in the adrenals were noted. Intravenous administration of strophanthin had no effect. After 60 days of kypokinesia, no further change in electrolyte concentration in the hypothalamas was noted. Further reduction in sodium, but an increase in potassium in the adrenals, and a progressive reduction of potassium content in the myocardium were noted. Administration of strophanthin caused no significant changes in electrolyte concentrations of the hypothalamus or adrenals, but it increased the sodium, chlorine and particularly potassium concentration of the myocardium. R.J.F.

**N82-30875***# National Aeronautics and Space Administration, Washington, D. C.

### BIOGENIC MONOAMIME CONTENT OF THE GANGLIA IN THE AUTONOMIC NERVOUS SYSTEM OF RABBITS DURING ACUTE EXPERIMENTAL EMOTIONAL STRESS

V. V. Portugalov, N. V. Petrova, S. I. Kashtanov, and B. N. Manukhin May 1982 13 p refs Transl. into ENGLISH from Patol. Fiziol. Ekap. Ter. (USSR), no. 5, Sep.-Oct. 1981 p 28-32 Original language document announced as A82-16817 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
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(NASA-TM-76900; NAS 1.15:76900) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

During emotional stress the content of norepinephrine in the adrenals, stellate ganglion and sympathetic chain increases, it decreases, in the myocardium and in the superior cervical ganglion it could not be determined. It was found that the content of epinephrine decreases in all the structures. Catecholamine depletion in the superior cervical ganglion has the most damaging effect of emotional stress. Introduction of electrodes into the hypothalamic ventromedial nuclei of intact rabbits induces shifts in the content of biogenic amines (in all structures with the exception of the myocardium). These shifts are similar in character but less pronounced than those in emotional stress. E.A.K.

**N82-30876***# National Aeronautics and Space Administration, Washington, D. C.

### EFFECT OF IMMOBILIZATION ON THE DEVELOPMENT OF EXPERIMENTAL ARTERIOSCLEROSIS IN RABBITS

G. P. Deryagina and T. A. Sinitsyna May 1982 10 p refs Transl. into ENGLISH from Patol. Fiziol. Ekap. Ter. (USSR), no. 5, Sep. - Oct. 1981 p 32-36 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76901; NAS 1.15:76901) Avail: Issuing Activity CSCL 06C

The permeability of the aortic wall increased as a result of immobilization within one month in animals given their usual food. Morphological examination revealed lipoidosis of the intima of the aorta and cardiac coronary arteries in 50 percent of cases. Preliminary immobilization of animals for one month with their subsequent maintenance on an atherogenic diet for five months increased the frequency of sharp and marked atherosclerotic changes in the aorta and coronaries as compared to that in animals kept only on an atherogenic diet for the same period. The changes in lipid metabolism and the blood coagulation system as a result of immobilization were less significant. Author

**N82-30877***# National Aeronautics and Space Administration, Washington, D. C.

### INFLUENCE OF STRESS ON THE BLOOD SYSTEM REACTION IN ADRENALECTOMIZED MICE

P. D. Gorizontov, M. I. Fedotova, and L. N. Yegorova May 1982 8 p refs Transl. into ENGLISH from Patol. Fiziol. Ekap. Ter. (USSR), no. 5, Sep. - Oct. 1981 p 36-39 Original language was announced as A82-16814 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
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The role of adrenocortical hormones in the cardiovascular system reaction to stress was studied on adrenalectomized and sham operated F1 mice. It is noted that under stress in hypocorticism the number of lymphoid cells in peripheral blood does not increase and the number of cells in the thymus did not decrease. No increase in the number of hemopoietic stem cells in the bone marrow was noted. The cells diminished in the early phase of stress in both sham operated mice and adrenalectomized mice. It is found that in the spleen neutrophilic leucocytosis is not dependent on the level of adrenal hormones. E.A.K.

**N82-30878***# National Aeronautics and Space Administration, Washington, D. C.

### EFFECT OF PROLONGED HYPOKINESIA ON RESISTANCE OF RESISTIVE VESSELS IN RATS

V. A. Saltykova Apr. 1982 8 p refs Transl. into ENGLISH from Kardiologiya (USSR), v. 20, no. 6, 1980 p 107-108 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of General Pathology and Pathological Physiology, Academy of Medical Sciences (USSR), Moscow
(Contract NASw-3542)
(NASA-TM-76849; NAS 1.15:76849) Avail: NTIS HC A02/MF A01 CSCL 06C

Under the effect of prolonged hypokinesia, the perfusion pressure in resistive vessels, measured under conditions of deep anesthesia and complete denervation, increased by approximately the same degree as arterial pressure in nonanesthetized animals. The increase in arterial, perfusion pressure and the resistance of resistive vessels in animals subjected to prolonged hypokinesia was accompanied by an increase in adrenoreactivity. During prolonged hypokinesia, partial obliteration of the vascular bed of the skeletal muscles plays a significant role in the observed increase in resistance of vessels of the extremities. The increase in adrenoreactivity of the vessels during hypokinesia may be realized as a partial case of an increase in the adrenoreactivity of structures whose innervation is disturbed. Author

**N82-30879***# National Aeronautics and Space Administration, Washington, D. C.

### EFFECT OF MEBICAR ON ANIMALS UNDER EXTREME CONDITIONS

I. Ye. Zimakova, R. A. Kamburg, and S. V. Kirshin May 1982 8 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 43, no. 4, Jul. - Aug. 1980 p 368-371 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76851; NAS 1.15:76851) Avail: Issuing Activity CSCL 06C

Mebicar, a new original tranquilizer, exerts a protective action on some parameters of body function under the influence of extreme conditions (stress, hypoxia). The antihypoxic effect of the drug manifests itself within a wide range (100-1000 mg/kg), and compares favorably with the effect of sodium hydroxybutyrate. Mebicar does not affect the muscle tone, movement coordination, or working capacity of the animals. It is suggested that the normalizing action of mebicar as a tranquilizer and antihypoxic agent may be related to its involvement in metabolism. Author

**N82-30880***# National Aeronautics and Space Administration, Washington, D. C.

**REACTION OF THE BLOOD SYSTEM TO SINGLE AND DOUBLE EFFECT OF A STRESS AGENT**

M. I. Fedotova and O. I. Belousova May 1982 8 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, Nov. - Dec. 1981 p 24-27 Original language document announced as A82-16814 Transl. by SCITRAN, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-76866; NAS 1.15:76866) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Transformation of reaction to immobilization repeated 6 and 14 days after the first immobilization was demonstrated. Neutrophilic leukocytosis and limphopenia are maintained in the blood but are less marked. It is concluded that a long term phase of increased body resistance develops after 6 hours of immobilization. E.A.K.

**N82-30881*#** National Aeronautics and Space Administration, Washington, D. C.

**ACTIVATION OF THE CEREBRAL GBA-ERGIC INHIBITING SYSTEM IN STRESS**

V. I. Pavlova, V. V. Malyshev, and F. Z. Meerson May 1982 11 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 1, Jan. - Feb. 1981 p 26-30 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-76867; NAS 1.15:76867) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Activation of the adrenergic and pituitary adrenal system which under the effects of prolonged severe stress factors such as immobilization or pain, was investigated. It is shown that activation of the hypophysealadrenal system in emotional pain stress in rats lasts 4 days after cessation of the stress effect and is attended regularly by activation of the GABA ergic inhibiting system. It is suggested that the GABA ergic inhibiting system is a nonspecific mechanism which is activated regularly when stress factors restricting the stress reaction act on the organism. E.A.K.

**N82-30882*#** National Aeronautics and Space Administration, Washington, D. C.

**SPECIFICITY OF ULTRASTRUCTURAL CHANGES IN RAT CARDIOMYOCYTES AFTER LOCAL GAMMA-IRRADIATION AND HYPOKINESIA**

V. S. Romanov and L. A. Bespalova May 1982 11 p refs Transl. into ENGLISH from Radiobiologiya (USSR), v. 21, no. 2, Mar.-Apr. 1981 p 238-242 Transl. by SCITRAN, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-76853; NAS 1.15:76853) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Analysis was made of the results of the electron-microscopic and morphometric studies of cardiomyocytes of 30 rats exposed to 516 mC/kg y-radiation, and myocardium of 30 animals subjected to hypokinesia for 50 days. The morphometric method revealed the distinctions on ultrastructural rearrangements in nuclei and mitochondria of myocardium cells with each effect applied. Author

**N82-30883*#** National Aeronautics and Space Administration, Washington, D. C.

**INDICES OF THE RAT CENTRAL NERVOUS SYSTEM METABOLISM DURING 36- AND 60-DAY HYPOKINESIA**

L. M. Kurkina, A. N. Panov, D. A. Reshevskaya, N. L. Tubinskaya, and R. A. Tigranyan May 1982 9 p refs Transl. into ENGLISH from Fiz. Zh. SSSR im. I. M. Sechenova, (USSR), v. 66, no. 4, Apr. 1980 p 475-479 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by USSR Academy of Sciences, Leningrad

(Contract NASw-3541)

(NASA-TM-76870; NAS 1.15:76870) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Male Wistar rats were kept hypokinetic for 46, 53, or 60 days to reveal biochemical alterations in the CNS. Neuronal and glial cytoplasmic RNA concentrations, acetylcholinesterase and butyrylcholinesterase activities, total thiol group content, and free amino acids were determined in various CNS tissues. A marked suppression of RNA metabolism appeared in the spinal cord, but RNA concentrations in the brain either did not change or increased slightly. There was a slight decrease of thiol group content in the brain. Amino acid determinations were inconclusive, but tended to show decreased amounts. The findings demonstrate that hypokinesia produces certain biochemical alterations, primarily suppression of activity, in certain regions of the CNS. Author

**N82-30884*#** National Aeronautics and Space Administration, Washington, D. C.

**ROLE OF THE THYROID GLAND DURING ADAPTATION OF SKELETAL MUSCLES TO INCREASED MOTOR ACTIVITY**

T. P. Seene, K. P. Alec, K. E. Tomson, and A. A. Viru May 1982 13 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 67, no. 2, Feb. 1981 p 299-305 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76871; NAS 1.15:76871) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Male Wistar rats were adrenalectomized or given MTU to produce thyroid deficits, then tested for physical performance during running and swimming. Quadriceps femoris muscle cells were tested for RNA and DNA content following sacrifice. It is found that thyroid hormone deficits reduce performance. Regular physical activity in intact animals leads to increased muscle mass and RNA content, while DNA and RNA content in muscle tissue is diminished in hypothyroid and adrenalectomized animals. E.A.K.

**N82-30885*#** National Aeronautics and Space Administration, Washington, D. C.

**CATECHOLAMINES IN THE BLOOD PLASMA OF AUGUST AND WISTAR RATS DURING EMOTIONAL STRESS**

R. Kvetnanskiy, T. I. Belova, Z. Oprshalova, I. Ponets, A. Lindra, and V. A. Dushkin May 1982 15 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 67, no. 4, Apr. 1981 p 516-523 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76872; NAS 1.15:76872) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Male August and Wistar rats were catheterized and immobilized to produce stress. Blood pressure and catecholamine concentrations were measured during and after immobilization to reveal differences in the two groups' responses. Arterial pressure varied in both strains, but soon returned to initial levels in the Wistar rats, showing these animals to have greater cardiovascular stability. Stable arterial pressure is associated with low initial plasma catecholamine levels and higher levels during stress and that adrenal medullary activity differs in the two strains. S.L.

**N82-30886*#** National Aeronautics and Space Administration, Washington, D. C.

**CHANGES OF BLOOD PLASMA RENIN ACTIVITY IN AUGUST AND WISTAR RATS UNDER EMOTIONAL STRESS**

R. Kvetnanskiy, T. I. Belova, A. Lindra, Z. Oprshalova, and V. A. Dushkin May 1982 8 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 67, no. 6, Jun. 1981 p 911-915 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76873; NAS 1.15:76873) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Adult male August and Wistar rats were catheterized, then immobilized for two hours in order to make a comparative study of the neurochemistry of the physiological function stabilization during emotional stress. Arterial pressure was measured and blood samples were taken to ascertain plasma renin and catecholamine levels. Plasma renin activity was somewhat higher in August than in Wistar rats, but the August rats had a greater variability in results. The highest renin activity was found in those animals with highest blood pressure and adrenalin levels. In most cases there was no link between renin activity changes and catecholamine levels. S.L.

**N82-30887*#** National Aeronautics and Space Administration, Washington, D. C.

**GLUCOCORTICOID RECEPTORS AND METABOLIC DISTURBANCES IN THE (RAT) LIVER AND HEART DURING IMMOBILIZATION**

A. I. Bobkov and V. P. Kislyakova May 1982 13 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 67, no. 8, 1981 p 1258-1264 Original language document announced as A82-10750 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76874; NAS 1.15:76874) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Male rats were immobilized for 30 min to 2 days to define the compensated and decompensated phases of stress. Intracellular steroid receptor interactions in the liver and heart, glucocorticoid dependent enzyme synthesis, and some aspects of cell metabolism were studied. The compensated phase was characterized by reduction of glucocorticoid binding by cytoplasmic receptors in response to highendogeneous glucocorticoid levels, increased liver tissue tyrosine aminotransferase (TAT) activity, and high blood glucose and cholesterol levels. Prolonged stress led to the decompensated phase, characterized by lower blood and tissue endogeneous glucocorticoid levels, depleted cell glucose and cholesterol reserves, reduced protein content, increased blood and tissue urea, marked hyponatremia, and reduced liver cell TAT activity. S.L.

**N82-30888*#** National Aeronautics and Space Administration, Washington, D. C.
**DNA AND RNA SYNTHESIS IN ISOLATED NUCLEI OF RAT SKELETAL MUSCLES DURING HYPODYNAMIA**
I. V. Fedorov, G. S. Komolova, and A. V. Chernyy May 1982 9 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 67, no. 10, Oct. 1981 p 1521-1524 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76875; NAS 1.15:76875) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Male Wistar rats were immobilized for 22 days to determine the effects on RNA synthesis rates in skeletal muscle cell nuclei. Nerve impulses from working muscles facilitate activation of transcription, either by stimulating RNA and DNA polymerase activities or by maintaining DNA template integrity. It was found that the RNA transcription was diminished 41.7% and DNA synthesis 37% in these animals. E.A.K.

**N82-30889*#** National Aeronautics and Space Administration, Washington, D. C.
**EMOTIONAL STRESS AS A FACTOR IN CARDIOVASCULAR DISTURBANCES**
K. V. Sudakov Jun. 1982 18 p refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 9, Sep. 1981 p 10-18 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76910; NAS 1.15:76910) Avail: Issuing Activity CSCL 06C

Model experimental emotional stress of rabbits and rats in serious conflict situations resulted in cardiovascular disturbances including ischemia and myocardial infarction in some animals. Animals were found to resist, adapt or be predisposed to cardiovascular disturbances. Limbic and reticular structures of the brainstem were found to be involved in changes of cardiac activity and arterial pressure. Individual and genetic differences in predisposition and resistance to cardiovascular disturbance were found in different genetic lines of rats. Catecholamine distribution in brainstem structures of predisposed and resistant rats were determined. Stagnant emotional excitation was found in separate experiments in the hypothalamus and reticular formation of the mesencephalon, resulting in visceral disturbances. This is associated with changes in sensitivity of individual reticular formation neurons. Author

**N82-30890*#** National Aeronautics and Space Administration, Washington, D. C.
**GENETIC AND INDIVIDUAL DIFFERENCES IN CARDIOVASCULAR DISTURBANCES OF RATS DURING EXPERIMENTAL EMOTIONAL STRESS**
K. V. Sudakov, V. A. Dushkin, and Ye. A. Yumatov Jun. 1982 17 p refs Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (USSR), no. 12, Dec. 1981 p 32-39 Original language doc. was announced as A82-23278 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by USSR Acad. of Med. Sci., Moscow
(Contract NASw-3541)
(NASA-TM-76911; NAS 1.15:76911) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

The arterial pressure and heart rate of rats (Wistar, way, August, random bred) was continuously recorded in 30 hour and 8 week immobilization emotional stress. Characteristic patterns of arterial pressure and heart rate in 30 hour immobilization were found. Wistar, rats had the highest resistance to stress and August rats the least. Criteria were developed to predict cardiovascular disturbances and death from the time variations of blood pressure and heart rate early in immobilization. Significant correlation was found between motor activity and individual and genetic resistance to emotional stress, based on which animals and groups of animals can be selected with known proportions of animals with different degrees of resistance and predisposition to emotional stress. Author

**N82-30891*#** National Aeronautics and Space Administration, Washington, D. C.
**EFFECT OF IMMOBILIZATION STRESS ON DIACYL- AND PLASMALOGEN-DERIVATIVES OF PHOSPHOLIPIDS IN VARIOUS RAT ORGANS AND TISSUES**
V. M. Dembitskiy and V. Ye. Ryabinin May 1982 9 p refs Transl. into ENGLISH from Vopr. Med. Khimii (USSR), v. 27, no. 5, Sep. - Oct. 1981 p 698-701 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Chelyabinsk Univ.
(Contract NASw-3541)
(NASA-TM-76852; NAS 1.15:76852) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

A quantitative distribution of plasmalogen and diacyl derivatives of different phospholipids was studied in various rat tissues during immobilization stress. The content of plasmalogens was decreased in various tissues, but the concentration of phosphatidyl acids, lysophosphatidyl choline and phosphatidyl glycerol was increased during the immobilization stress. S.L.

**N82-30892*#** National Aeronautics and Space Administration, Washington, D. C.
**EFFECT OF SENSITIZATION ON DEVELOPMENT OF STRESS GASTRIC ULCERS IN RATS**
Yu. S. Malov, A. R. Lapin, and G. P. Plutashko May 1982 7 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 1, Jan. - Feb. 1981 p 30-33 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76868; NAS 1.15:76868) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

The role of emotional stress in the development of gastric ulcers is evaluated. The experimental procedure employing rats as the test subjects is described. Stress factors may cause the development of the ulceration process in the human stomach. S.L.

**N82-30893*#** National Aeronautics and Space Administration, Washington, D. C.
**SPECIFIC CYTOPLASMIC GLUCOCORTICOID RECEPTORS OF RAT LIVER UNDER CONDITIONS OF IMMOBILIZATION STRESS**
P. P. Golikov, A. I. Bobkov, and A. S. Bobkova May 1982 9 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, Nov. - Dec. 1980 p 20-24 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76863; NAS 1.15:76863) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

The binding of dexamethasone and corticosterone by scientific cytoplasmic receptors of the liver was studied on intact and adrenalectomized animals and in those subjected to stress. The receptor hormone complex dissociation constants are calculated according to Scatchard. E.A.K.

**N82-30894*#** National Aeronautics and Space Administration, Washington, D. C.
**SPECIFIC CYTOPLASMIC GLUCOCORTICOID RECEPTORS OF THE RAT LIVER DURING IMMOBILIZATION STRESS**
P. P. Golikov, A. I. Bobkov, and A. S. Bobkova May 1982 11 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR),

v. 66, no. 3, 1980 p 416-421 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76869; NAS 1.15:76869) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06C

Adrenalectomized, intact, and stressed male Wistar rats were analyzed for dexamethasone and corticosterone binding by specific cytoplasmic receptors in the liver. Scatchard analysis provided dissociation constants for receptor hormone complexes. The number of binding sites diminished during stress. It is suggested that measures taken to combat the effects of stress cause increasing steroid receptor interactions in the liver, restoring adaptive enzyme induction, and normalizing metabolic processes. E.A.K.

**N82-30895#** Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
**INVESTIGATION OF BEHAVIORALLY MODIFIED RATS FOR USE IN EXPLOSIVES DETECTION SYSTEMS Fiscal Year Report, 1976 - 1981**
Raymond V. Nolan Dec. 1981 197 p refs
(AD-A114632; MERADCOM-2343) Avail: NTIS HC A09/MF A01 CSCL 19/1

Experiments were devised to improve the reliability and versatility of that class of detector systems currently known as in vivo biosensors. The target substance of interest in this research was the military explosive TNT. The research was designed to prove the validity of four theses: (1) Rats can detect TNT vapor via their olfactory function; (2) Trained rats will operantly signal the arrival of TNT vapor at their nares; (3) Rats may be trained en masse to function as biosensor detection systems; (4) The electroencephalogram (EEG) of trained rats contains specific signals uniquely related to their awareness of TNT vapor. Albino male rats were equipped with four chronic indwelling brain electrodes, three of which were electroencephalograpgh (EEG) pick-off electrodes juxtaposed to the dura mater, while the fourth lead was a stimulus electrode embedded in the medial forebrain bundle (MFB). Electrical brain stimulation (EBS) was applied to the MFB (which has been termed a pleasure center), as a conditioning stimulus duri;ng training and reinforcement sessions. Subjects were first conditioned by operant methods to associate the presence of TNT vapors with EBS and to signal awareness of the target substances by treadle pressing. The four theses postulated above were proven individually. It has thus been demonstrated that properly conditioned rats can, in fact, be utilized as sensory elements in bio-sensor explosives detection systems. GRA

**N82-30896#** Larc Association, Tempe, Ariz.
**BIOFOULING COUNTERMEASURE EVALUATIONS FOR OTEC HEAT EXCHANGERS**
R. O. Lewis Jun. 1981 19 p refs
(Contract W-31-109-eng-38)
(DE82-003918; ANL/OTEC-BCM-020) Avail: NTIS HC A02/MF A01

Several promising countermeasure methods for maintaining heat transfer efficiency in OTEC heat exchangers were evaluated. Heat transfer monitors were utilized to evaluate the effectiveness of several countermeasure methods for candidate. OTEC heat exchanger tubing. Countermeasure methods evaluated included the use of abrasive slurries, Amertap sponge rubber balls (alone and in combination with continuous and intermittent chlorination), M.A.N. brush, surfactant/dispersant organic chemical cleaning and continuous and intermittent chlorination. DOE

**N82-30897#** Harvard Univ., Cambridge, Mass. Div. of Applied Science.
**COATINGS FOR THE PREVENTION OF MACROFOULING IN THE OTEC PROGRAM Final Report**
Ralph Mitchell and Paul J. Boyle (Policy and Management Associates, Inc.) Jul. 1981 90 p refs
(Contract W-31-109-eng-38)
(DE82-003238; ANL/OTEC-BCM-021) Avail: NTIS HC A05/MF A01

A survey was conducted of antifoulant coatings that are currently available for controlling macrofouling in the marine environment. An overview of macrofouling problems that can be expected in various phases of the OTEC program is presented. The various general types of coatings systems, methods, and construction materials that are presently available for the control of marine macrofouling are summarized. These include copper coatings, organo-metallic coatings, low energy coatings, ablative coatings, antifouling fiber reinforced plastics, antifouling concrete, and electrochemical protection methods. The various available coating compositions and electrochemical methods of macrofouling prevention are described. Commercially available antifouling coatings ar listed. A selected list of marine coatings manufacturers is also provided. A selected bibliography of references on marine macrofouling prevention is included. DOE

**N82-30898#** Decision Focus, Inc., Palo Alto, Calif.
**AN ANALYTIC FRAMEWORK FOR ALLOCATING R AND D RESOURCES AT GRI Annual Report, Sep. 1980 - Jun. 1981**
Robert A. Marshalla, Dale M. Nesbitt, and Donna B. Oman Nov. 1981 296 p
(Contract GRI-5080-310-0326)
(PB82-168428; GRI-80/0092) Avail: NTIS HC A13/MF A01 CSCL 05A

A comprehensive technique that eliminates the need for direct subjective estimates of market outcomes was developed. Engineering assessments of technical outcomes are inherently more reliable because they can be unambiguously defined. A comprehensive energy economy model to compute their market impacts on a consistent basis is used. The new technique avoids inconsistencies and explicitly takes into account all technical and economic uncertainties that may afect project areas. The new technique is fully compatible with the PAM and applies to efficient utilization as well as supply project areas. GRA

**N82-30899#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: LIFE SCIENCES. EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 6**
16 Jul. 1982 93 p refs Transl. into ENGLISH from various Russian articles
(JPRS-81300) Copyright. Avail: Issuing Activity

Nonionizing electromagnetic radiation and its biological and physiological effects on animals and humans was studied. The following topics are discusse: stimulating effects of exposure of rat sterum to variable magnetic fields on antibody production in the spleen; biological and therapeutic effects of magnetic fields; different nervous sytem reactions; systematic adaptation reactions; use of magnetbiological effects in neurosurgery; changes in peripheral circulation in limbs during bone regeneration; changes in transcapillary metabolism in chronic venous insufficiency of legs; chromatin of rat brain neurons and nucleic acids of muscles as related to localization of decimeter waves during exercise; heat distribution in tissues; low frequency effects on animals of different ages; meteorological radar as source of SHF electromagnetic field energy and problems of environmental hygiene; effects of microwave radiation and resitance to ionizing radiation; effects of single exposure to microwaves on quantity and functional properties of T and B lymphocytes; and cytogenetic and gonadotozic effects of static electric fields. For individual titles, see N82-30900 through N82-30916.

**N82-30900#** Joint Publications Research Service, Arlington, Va.
**STIMULATING EFFECT OF EXPOSURE OF RAT STERNUM TO VARIABLE MAGNETIC FIELD ON ANTIBODY PRODUCTION IN THE SPLEEN**
O. F. Melnikov, A. A. Diyesperova, E. A. Bakay, and A. I. Rudoy *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 1-5 refs Transl. into ENGLISH from Fiziol. Zh. (Kiev), v. 28, no. 1, Jan. - Feb. 1982 p 109-112

Avail: Issuing Activity

The possibility of stimulating antibody production by exposing the sternum, at the projection of the thymus, to a variable frequency magnetic field was investigated. Agents capable of selectively altering functional activity of the immunogenetic system were studied. Physical factors along with biological agents are used, most often from thymus tissue and their synthetic analogues. It is demonstrated that exposure to variable electromagnetic fields could activate antibody genesis. Besides the entire lymphoid tissue system, other organs and systems are exposed to magnetic fields, which is not always desirable. E.A.K.

**N82-30901#** Joint Publications Research Service, Arlington, Va.
**STATUS AND PROSPECTS OF RESEARCH ON BIOLOGICAL AND THERAPEUTIC EFFECTS OF MAGNETIC FIELDS**

V. M. Bogolyubov *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 6-10 Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Kult. (Moscow), no. 4, Jul. - Aug. 1981

Avail: Issuing Activity

Biological effects of magnetic fields (MF) on physiological aspects and general questions in appreciation of this factor were examined. Therapeutic use of MF, magnetohygiene, magnetoecology, biomagnetism is discussed. Biotropic parameters of MF which refer to the physical characteristics of the field that determines the mechanisms of its interaction with biological systems, as well as biological effects was formed in magnetobiology. Intensity, gradient, vector frequency and shape of pulses, as well as duration of exposure are among the main biotropic parameters of MF. E.A.K.

**N82-30902#** Joint Publications Research Service, Arlington, Va.

### DISTINCTIONS OF NERVOUS SYSTEM REACTIONS TO ARTIFICIALLY INTENSIFIED MAGNETIC FIELDS

Yu. A. Kholodov *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 11-15 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 5-9

Avail: Issuing Activity

The reaction of the body systems to exogenous, intensified magnetic fields (MF) was studied. Body systems are ranked in the following order according to extent of involvement in reacting to total body exposure to MF: nervous, endocrine, sense organs, cardiovascular, blood, digestive, muscles, excretory, respiratory, integument and bone. The presence of both local changes and reactions by systems not directly exposed to local MF shows that regulatory system, nervous and endocrine, is involved in reactions to MF. The distinctions of some reactions of the nervous system to MF are discussed. E.A.K.

**N82-30903#** Joint Publications Research Service, Arlington, Va.

### MECHANISM OF BIOLOGICAL EFFECTS OF MAGNETIC FIELDS

N. A. Udintsev *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 16-0 refs Transl. into ENGLISH from Vopr. Kurotol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 9-12

Avail: Issuing Activity

Magnetic fields (MF) of different intensities and frequencies are used more extensively for treatment of diseases of the skeletomuscular system, vessels and gastrointestinal tract. The mechanism of biological effects of MF, like other physiotherapeutic factors, a systemic organization of functions were investigated. The state of the neuroendocrine system and metabolism after total body exposure of white rats to variable MF (VMF) with 20 mT induction and at a frequency of 50 Hz was studied. Data obtained during brief exposure to MF are presented. E.A.K.

**N82-30904#** Joint Publications Research Service, Arlington, Va.

### FORMATION OF SYSTEMIC ADAPTATION REACTIONS IN STATIC MAGNETIC FIELDS

M. A. Shishlo, S. Kh. Kubli, and L. L. Shimkevich *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 21-27 refs Transl. into ENGLISH from Vopr. Kurortol. Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 12-18

Avail: Issuing Activity

The activation of compensatory and adaptive processes, as well as formation of systemic adaptive reactions which enhance resistance to deleterious environmental factors, during exposure to magnetic fields were examined. Animals were exposed daily to static magnetic field (SMF), with a large volume of tissues in the field interaction. An increase in dispersion of resistance without change in its mean level after two SMF treatments was observed. By the 8th to 9th da reliable increase in resistance decreased substantially. It is found that under the influence of many weeks of exposure to magnetic fields fluctuations of these parameters persist but their amplitude gradually disappears. E.A.K.

**N82-30905#** Joint Publications Research Service, Arlington, Va.

### POSSIBLE USE OF MAGNETOBIOLOGICAL EFFECTS IN NEUROSURGERY

R. P. Kikut, M. E. Liyepa, G. A. Kruminya, S. R. Kikute, E. A. Vitols, and D. L. Apshkalne *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 28-33 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 18-24

Avail: Issuing Activity

The use of magnetic fields (MF) in neurosurgery was studied. The possibility of using magnetobiological effects in the presence of neurovascular, neurooncological and inflammatory diseases of the central nervous system involving adhesive and glial processes was explored. The biological effects of MF are investigated and new methods of treating neurosurgical patients, which could supplement or replace existing surgical methods are developed. Data on the use of MF in neurosurgery and magnetic property of attracting ferromagnetic particles are provided. E.A.K.

**N82-30906#** Joint Publications Research Service, Arlington, Va.

### CHANGES IN PERIPHERAL CIRCULATION OF LIMBS DURING BONE REGENERATION UNDER INFLUENCE OF LOW-FREQUENCY MAGNETIC FIELDS

I. M. Mitbreyt, G. I. Lavrishcheva, and V. A. Dirin *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 34-38 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 24-27

Avail: Issuing Activity

Reparative regenerative processes in bone tissue are largely determined by the state of circulation in the injured limb segment. The role of peripheral circulation in the extremity in the mechanism of action of low frequency magnetic fields (MF), on reparative regeneration of bone was investigated. It is indicated that MF at a frequency of 50 Hz, an induction of 10 mT under both experimental and clinical conditions, has a marked effect on peripheral circulation in extremities and improve tissular trophics in the course of bone regeneration in fractures of the distal epimetaphysis of the radius. E.A.K.

**N82-30907#** Joint Publications Research Service, Arlington, Va.

### CHANGES IN TRANSCAPILLARY METABOLISM IN PATIENTS WITH CHRONIC VENOUS INSUFFICIENCY OF LEGS UNDER INFLUENCE OF STATIC MAGNETIC FIELDS

B. N. Zhukov, L. A. Trufanov, and S. M. Musiyenko *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 39-43 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 28-31

Avail: Issuing Activity

Magnetotherapy in the treatment of peripheral vascular diseases was investigated. Experimental and clinical data are collected and indicated the beneficial effects of magnetic fields (MF) on some forms of vascular pathology. However, the mechanism of therapeutic action of MF, with indications and contraindications for its use have not yet been investigated sufficiently. Transcapillary metabolism and microcirculation in patients with chronic venous insufficiency of the legs were studied. Biophysical parameters which were monitored dynamically are presented. E.A.K.

**N82-30908#** Joint Publications Research Service, Arlington, Va.

### CHROMATIN OF RAT BRAIN NEURONS AND NUCLEIC ACIDS OF MUSCLES AS RELATED TO LOCALIZATION OF DECIMETER WAVES DURING EXERCISE

Z. A. Sokolova *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 44-47 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kult. (Moscow), no. 4, Jul. - Aug. 1981 p 35-38

Avail: Issuing Activity

The effects of different localizations of DMW on structural and functional state of chromatin (deoxyribonucleoprotein--DNP) of cerebral neuronal nuclei and nucleic acid content of rat muscles during intensive physical exercise were studied. Experiments were conducted on 60 white male Wistar rats weighing 180 to 220 g. The physical load consisted of graded daily swimming in fresh water at a temperature of 28 to 32 deg for 4 weeks. DMW were generated by a Volna 1 unit (emitter with 4 cm diameter, intensity of 120 mW/sq cm). The waves were delivered to the region of the femoral muscles, adrenals or head for 3 min/day to a total of 10 times. S.L.

**N82-30909#** Joint Publications Research Service, Arlington, Va.

**DISTRIBUTION OF HEAT IN BIOLOGICAL TISSUES UNDER INFLUENCE OF UHF ELECTROMAGNETIC FIELDS**

P. V. Svetitskiy *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 48-53 refs Transl. into ENGLISH from Med. Braiol. (Moscow), v. 27, no. 3, Mar. 1982 p 46-49

Avail: Issuing Activity

The link between nature of distribution of generated heat in biological tissues and technical parameters is determined in order to control the biological effects of UHF EMF hyperthemia. The same intensity of exogenous EMF can elicit different levels of induced endogenous EMF, for which reason there is a change in heating of tissues. This phenomenon depends on the size and shape of biological objects, their orientation in relation to EMF vectors, morphological structures and electric properties of tissues, and intensity of energy emission by tissues as a result of vital functions. The distribution of heat in biological tissues exposed to UHF radiation was studied, in order to serve as a guide for clinical work. S.L.

**N82-30910#** Joint Publications Research Service, Arlington, Va.

**EFFECTS OF LOW-FREQUENCY (50 Hz) ELECTRIC FIELDS ON ANIMALS OF DIFFERENT AGES**

I. P. Kazyarin *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 54-57 refs Transl. into ENGLISH from Gigiyen. Sanitariya (Moscow), no. 8, Aug. 1981 p 18-19

Avail: Issuing Activity

The comparative sensitivity of young (growing) and old animals to 50 Hz electric fields was examined. The biological mode consisted of 40 male white rats 1.5 to 2 months of age, weighing 90 to 100 g, and 1.5 to 2 years old, weighing 400 to 500 g, which were divided into 4 groups of 10 animals. The 1st group (young) and 3d (old) group served as a control, while the rats in the 2d and 4th groups were exposed daily to commercial frequency electric fields (CFEF) of 15 kV/m for 30 min a day, for 2 months. For this purpose, the animals were placed in special dielectric cages with simulated electric field of 50 Hz generated by means of high voltage tank [oil] transformers. The animals' condition was assessed on the basis of dynamics of body weight, static work capacity, summation threshold index, latency period of unconditioned reflex, duration of hexenal induced sleep, overall exchange of gases and blood cholinesterase activity. These parameters were determined before the experiment (background data) and every 2 weeks during exposure. S.L.

**N82-30911#** Joint Publications Research Service, Arlington, Va.

**METEOROLOGICAL RADAR AS SOURCE OF SHF ELECTROMAGNETIC FIELD ENERGY AND PROBLEMS OF ENVIRONMENTAL HYGIENE**

Yu. D. Dumanskiy, N. G. Nikitina, L. A. Tomashevskaya, F. R. Kholyavko, K. S. Zhupakhin, and V. a. Yurmanov *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 58-63 refs Transl. into ENGLISH from Gigiyen. i Sanitariya (Moscow), no. 2, Feb. 1982 p 7-11

Avail: Issuing Activity

The electromagnetic situation at locations of meteorological radar stations (MRS) and biological implications of electromagnetic fields generated by radar devices used for meteorological purposes was studied. The specifications of the MRS and their operating modes were determined, and the patterns of distribution of electromagnetic energy generated by MRS in the environment was established. A method was developed to measure electromagnetic fields in the superhigh frequency range using instruments and calculations. S.L.

**N82-30912#** Joint Publications Research Service, Arlington, Va.

**EFFECTS OF MICROWAVE RADIATION ON MOUSE HEMOPOIETIC STEM CELLS AND ON ANIMAL RESISTANCE TO IONIZING RADIATION**

D. Rotkovska, A. Vacek, and A. Bartonickova *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81200) 16 Jul. 1982 p 64-69 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 21, no. 4, Jul. - Aug. 1981 p 558-562
N82-30899 21-51)

Avail: Issuing Activity

The effects of microwave (MW) on hemopoiesis in mice are discussed. Stimulation of colony-forming capacity of bone marrow and the spleen was demonstrated after total body exposure of mice for 5 min at the parameters used. This MW effect was used to enhance mouse resistance to ionizing radiation. S.L.

**N82-30913#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF SINGLE EXPOSURE TO MICROWAVES ON QUANTITY AND FUNCTIONAL PROPERTIES OF T AND B LYMPHOCYTES OF GUINEA PIG AND MOUSE SPLEEN**

I. A. Rudakov, S. F. Rudakova, I. V. Rizhinskaya, and O. S. Ogurtsova *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 70-74 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 21, no. 4, Jul. - Aug. 1981 p 626-629

Avail: Issuing Activity

Parameters of cellular immunity of animals at different intervals following single exposure to microwaves of thermal intensity were studied. The first series of experiments was performed with guinea pigs weighing 300 to 400 g, who were submitted to single total body exposure to microwaves in the reactive zone using a Luch 58 unit (frequency 2375 MHz, distance from emitting antenna horn 30 cm, output power 100 W, exposure 15 min). As a result of such exposure, the animals' body temperature rose by 4 to 4.5 C. Immediately after irradiation, as well as 1, 4, 7, and 21 days later, the animals were sacrificed; the spleen was excised under sterile conditions and a pooled suspension of spleen cells from 3 to 5 animals was obtained, which was then used to assess spontaneous and concanavalin A induced lymphocyte blast transformation by recording radioactivity of H3 thymidine incorporated in DNA. S.L.

**N82-30914#** Joint Publications Research Service, Arlington, Va.

**MAIN DIRECTIONS OF SOVIET RESEARCH ON BIOLOGICAL EFFECTS OF MICROWAVE RADIATION**

M. G. Shandala, M. I. Rudnev, Ye. F. Stoyan, and G. I. Vinogradov *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 75-80 refs Transl. into ENGLISH from Gigiyen. i Sanitariya (Moscow), no. 10, Oct. 1981 p 4-7

Avail: Issuing Activity

The effects of low intensity microwaves, ranging from 1 to 1000 microwatt/sq cm. Biological validation of standards on the basis of experimental research and studies of the health status of individuals residing in areas where this factor is present to some degree is considered to be the only correct approach to the problem of setting standards for microwave. Strict simulation of irradiation conditions in animal experiments enables the nature, degree, and main patterns of biological effects, including deleterious effect of the factor, as a function of its intensity, duration of exposure, wavelength and other variables to be determined. Special attention is given to the choise of tests characterizing the functional state of the organism. S.L.

**N82-30915#** Joint Publications Research Service, Arlington, Va.

**CYTOGENETIC AND GONADOTOXIC EFFECTS OF STATIC ELECTRIC FIELDS**

K. I. Stankevich, I. N. Badayeva, L. V. Samosh, and L. Z. Shumova *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 81-84 refs Transl. into ENGLISH from Gigiyen. i Sanitariya (Moscow), no. 10, Oct. 1981 p 9-11

Avail: Issuing Activity

The effects of static electric fields on morphological and genetic structures of testicular cells of white mongrel mice was studied. The effects according to incidence of cytogenetic disturbances in meiotic chromosomes at the diakinesis-metaphase Istage in male mice was evaluated; preparations of testes were submitted to histological analysis. Experiments were conducted on a device, which consists of a chamber for experimental animals, double plated electrodes, adjustable brackets, aerofranklinizer connected into the power line and a kilovoltmeter. Field intensity in the chambers was regulated with the aerofranklinizer switch and distance between electrodes, on the basis of E = V/H, where E is field intensity, V is voltage on the kilovoltmeter scale and H is distance between electrodes. S.L.

**N82-30916#** Joint Publications Research Service, Arlington, Va.

### EFFECTS OF SUPERHIGH FREQUENCY ELECTROMAGNETIC FIELDS ON ANIMALS OF DIFFERENT AGES

O. I. Shutenko, I. P. Kozyarin, and I. I. Shvayko *In its* USSR Rept.: Life Sci., No. 6 (JPRS-81300) 16 Jul. 1982 p 85-90 refs Transl. into ENGLISH from Gigiyen. i Sanitariya (Moscow), no. 10, Oct. 1981 p 35-38

Avail: Issuing Activity

Effects of superhigh frequency (SHF) electromagnetic fields (EMF) on young (growing) and mature animals were tested. The experimental model consisted of 90 male white rats initially weighing 70 to 80 and 160 to 200 g, which were divided into 6 groups of 15 animals in each, depending on intensity of the factor used. The animals of the first (young) and fourth (puberal) groups served as a control. The second, third (young) and fifth, sixth (mature) groups were exposed to an SHF field with energy flux density (EFD) of 10 and 100 microwatts/sq cm, respectively, for 2 h/day over a period of 10 weeks. We used the Luch-58 magnetron SHF generator, at working frequency of 2375 + or - 50 MHz (wavelength 12.6 cm) as the source of SHF radiation. The animals were irradiated in groups in the zone of the formed field in an ordinary room with cinder block walls (temperature 18 to 20 C, humidity 40 to 60%). We used a PO 1 instrument (Medik 1) for dosimetry. We measured EFD of the SHF field over the entire area of the room. The animal cages were placed in areas where the fields constituted 10 and 100 microwatts/sq cm. S.L.

**N82-30917*** National Aeronautics and Space Administration, Washington, D. C.

### AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES

May 1982 150 p
(NASA-SP-7037(148); NAS 1.21:7037(148)) Avail: NTIS HC $5.00 CSCL 06E

This bibliography lists 512 reports, articles and other documents introduced into the NASA scientific and technical information system in April 1982. E.A.K.

**N82-30918*#** National Aeronautics and Space Administration, Washington, D. C.

### EFFECT OF HYPOKINESIA ON SOME RED BLOOD INDICES AND THE CONDITION OF REGULATORY SYSTEMS

B. M. Fedorov, V. S. Nevstruyeva, and G. D. Reushkina May 1982 12 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 4, 1980 p 61-65 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76752; NAS 1.15:76752) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06P

Hypokinesia induces a decrease in the catecholamine level in the hypothalamic, myocardial and adrenal tissues of rabbits and a decrease in the erythrocyte count and hemoglobin content. Two intravenous strophanthin injections given in different periods of hypokinesia lasting up to 12 to 60 days promote the normalization of the values of hormonal mediator metabolism; the red blood values are normalized only in the early periods of hypolinesia. R.J.F.

**N82-30919*#** Technology, Inc., Houston, Tex. Life Sciences Div.

### A GENERAL PURPOSE DATA ACQUISITION AND ANALYSIS SYSTEM FOR NYSTAGMUS AND RELATED DATA

William G. Crosier Feb. 1982 261 p
(Contract NAS9-14880)
(NASA-CR-167704; NAS 1.26:167704) Avail: NTIS HC A12/MF A01 CSCL 06P

A system for collecting and analyzing nystagmus and related data is described. The system uses commercially available equipment for performing caloric irrigation and rotating chair tests on human subjects in order to evaluate certain characteristics of the human vestibular system. Three programs and their associated subprograms which are used with a laboratory microcomputer to perform three primary tasks are discussed. These include: (1) control and collect data in real time from a nystagmus experiment, (2) analyze data from eye movements and related signals in order to measure such variables as eye velocities, and (3) provide hard copy formatted reports for reduced test data. S.L.

**N82-30920#** Medical Research Council, Cambridge (England). Applied Psychology Unit.

### COGNITIVE PERFORMANCE, SLEEP QUALITY AND MOOD DURING DEEP OXY-HELIUM DIVING

Vivien J. Lewis and Alan D. Baddeley Jan. 1981 32 p refs
(RNP-1/81; BR79073) Avail: NTIS HC A03/MF A01

A series of simulated saturation oxyhelium dives, examining physiological and psychological changes in man in high pressure conditions were studied. A series of five dives are reported, lasting between 18 and 26 days, and reaching maximum depths of between 300 msw and 540 msw. Tests of cognitive functioning, including associative and short term memory, arithmetic ability, perceptual speed, spatial manipulation, grammatical reasoning and semantic processing, were administered to well practiced subjects prior to each dive, at maximum depth and again during decompression. Self report measures of sleep and mood questionnaires were administered for a period extending from one week before each dive commenced until at least one week after the dive was completed. S.L.

**N82-30921#** Royal Signals and Radar Establishment, Malvern (England).

### MEDICAL THERMOGRAPHY WITH A PYROELECTRIC VIDICON CAMERA

D. E. Burgess Mar. 1981 17 p refs Original contains color illustrations
(RSRE-3365; BR79226) Avail: NTIS HC A02/MF A01

A pyroelectric vidicon camera for use in medical thermography is discussed. The equipment used and the results obtained are described. B.W.

**N82-30922*#** National Aeronautics and Space Administration, Washington, D. C.

### RNA ACCUMULATION IN THE BODY OF NEURONS AS AN INDICATOR OF THEIR FUNCTIONAL DEAFFERENTATION

V. A. Klenikova and L. D. Malinauskayte Apr. 1982 10 p refs Transl. into ENGLISH from Fiz. Zh. SSSR (USSR), v. 6, no. 3, 1980 p 339-343 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76850) Avail: Issuing Activity CSCL 06P

Using two wave cytospectrophotometry in the ultraviolet and visible regions of the spectrum, it is shown that prolonged functional deafferentation, evoked by visual deprivation or induced hypokinesia, caused a pronounced accumulation of RNA in the visual neurons of the cerebral cortex and in the motor neurons of the spinal cord, respectively. A similar, although quantitatively less considerable, accumulation of RNA is noted with intensified stimulation of these neurons, whereas a combination of deafferentation and stimulation weakened, and in a number of cases completely eliminated, the accumulation of RNA, evoked by deafferentation. The obtained data indicate that the accumulation of RNA in the body of neurons may serve as an indicator not so much of intensified, but, conversely, weakened sensory pulsation. In the latter case, the mechanism of this accumulation is associated with the weakening of utilization of RNA by the neurons. Author

**N82-30923*#** National Aeronautics and Space Administration, Washington, D. C.

### EFFICACY OF CIMETIDIN IN THE PREVENTION OF ULCER FORMATION IN THE STOMACH DURING IMMOBILIZATION STRESS

G. I. Dorofeyev, I. A. Litovskiy, L. K. Gavrovskaya, and V. T. Ivashkin May 1982 9 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, Nov. - Dec. 1980 p 24-27 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Dept. of Hospital Therapy, S. M. Kirov Military Medical Academy, Leningrad
(Contract NASw-3542)
(NASA-TM-76864; NAS 1.15:76864) Avail: NTIS HC A02/MF A01 CSCL 06E

The effect of stress on the formation of ulcers in the mucous membrane of the stomach, the increase in cyclic adenosine monophosphate level in the gastric tissues, and parietal cell structure alteration. Use of cimetidin prevents these effects Author

**N82-30924*#** National Aeronautics and Space Administration, Washington, D. C.

**THE ROLE OF THE HYPOPHYSIS IN EARLY REACTION OF HEMOPOIETIC ORGANS TO STRESS**

Yu. B. Deshevoy May 1982 9 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 2, Mar. - Apr. 1980 p 50-54 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76865) Avail: Issuing Activity CSCL 06P

Rats are used in experiments to study the role of the hypophysis in the reaction of the hemopoietic organs during the early period of stress reactions. Results show that preliminary hypophysectomy prevents the reduction in the number of lymphoid cells in the thymus, but has no effect on the devastation of the spleen. S.L.

**N82-30925*#** National Aeronautics and Space Administration, Washington, D. C.

**REACTION TO HYPOKINESIA AND HYPERKINESIA OF SOMATOCHROME NEURONS IN THE MOTOR ZONE OF THE CEREBRAL CORTEX IN RABBITS**

L. A. Zaruba Jun. 1982 8 p refs Transl. into English from Vestn. Zool. (USSR), no. 3, 1979 p 61-63 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76885; NAS 1.15:76885) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06P

A group of rabbits were subjected to limited mobility for 2-2.5 months, another group to daily moderate running exercise on a treadmill during 3, 5, 8 and 9 months with a 3rd group serving as control. Analysis of sections of the cerebral cortex motor zone revealed that a presence of impulses coming from peripheral receptors was necessary for a normal activity of nerve cells. The 2 months hypokinesia disturbed the metabolism of nerve cells. In the absence of peripheral stimulation the size of the cell body decreased due to water disturbance in the cell. By 2.5 months the animals adapted to hypokinesia and differences in volume of the neuron, its nucleus and RNA content in neurons became insignificant. Long-term flow of stimulation from the periphery resulted in increased protoplasm mass while the volume of the nerve cell nucleus increased comparatively less. Prolonged increase of nerve cell activity heightened the expenditure of RNA. In this case the RNA functioned as the energy source which was necessary for protein synthesis by the cell. Author

**N82-30926*#** National Aeronautics and Space Administration, Washington, D. C.

**STATE OF THE ENDOCRINE GLANDS IN HYPODYNAMIA (A REVIEW OF THE LITERATURE)**

V.I. Korkach May 1982 16 p refs Transl. into ENGLISH from Vrach. Delo (USSR), no. 2, Feb. 1981 p 11-16 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76906; NAS 1.15:76906) Avail: Issuing Activity CSCL 06B

The effect of hypodynamia on gland secretion in humans and animals was studied. The glands investigated included the thymus, thyroid, hypothalamus, and adrenal glands. S.L.

**N82-30927*#** National Aeronautics and Space Administration, Washington, D. C.

**CONTROL OF MUSCLE ACTIVITY IN UNLOADED CONDITIONS**

A. V. Kovalik May 1982 7 p refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol. (USSR), no. 8, Aug. 1981 p 44-45 Original language document announced as A82-15712 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76883; NAS 1.15:76883) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06P

The ability of human test subjects to voluntarily tense specific muscle groups was. It was shown that less tension is generated than in overcoming an external load and that muscles of the upper half of the body are generally more controllable and generate greater tension than those of the lower half of the body. It is also noted that voluntary muscle tension can be generated in any sequence of muscle groups and for at least 3 hours continuously. It is found that 2 weeks of training produces greatly improved precision and selectivity on muscle tensing. E.A.K.

**N82-30928#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

**PULMONARY FUNCTION MEASURES BEFORE AND AFTER EXPOSURE OF HUMAN SUBJECTS TO +G(z) AND +G(x) ACCELERATION LOADS**

Edwin Hendler 28 Sep. 1981 25 p refs
(ZR0000101)
(AD-A114652; NADC-81236-60) Avail: NTIS HC A02/MF A01 CSCL 06/19

Baseline dynamic lung volume measurements were determined on four subjects seated upright or reclined, both with and without inflation of an anti-G suit (AGS). Additional measurements were made before and after exposing the subjects to double acceleration pulses using the NADC Dynamic Flight Simulator. During the acceleration exposures, the subjects were either seated upright or were reclined; they wore an inflated AGS and either did or did not perform the M-1 maneuver. Acceleration pulses lasted 20 or 40s, and ranged in magnitude from 3 to 7 G. The effects of body position, G-protective clothing, and acceleration exposure on pulmonary function measures derived from flow-volume loops are described. GRA

**N82-30929#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**AIRCREW IONIZING DOSES FROM RADIOACTIVE DUST CLOUD GENERATED BY NUCLEAR BURST M.S. Thesis**

Burl E. Hickman Mar. 1982 77 p refs
(AD-A115541; AFIT/GNE/PH/82M-9) Avail: NTIS HC A05/MF A01 CSCL 06/18

This report will evaluate the threat of radioactive fallout to which aircrew members will be exposed when flying through a descending fallout cloud. A computer program is developed for calculating the ionizing dose rate of a radioactive dust cloud as a function of time, and also the dose that an aircrew receives when flying through the respective cloud. A cloud model that is patterned after the AFIT fallout smearing code was developed. A comparison is made between the activities at various altitudes from 305 meters to 9150 meters to provide information for possible re-direction of flight. The external ionizing dose to the aircrew is computed by the new code considering the cloud size, the aircraft's transit time through the cloud, and the ingestion rate of radioactive particles into the aircraft's cabin. Information is also provided to indicate the method by which doses can be computed from a cloud of multiple bursts. The results demonstrate that total dose to each aircrew member is approximately 8 rems after flying through a fallout cloud one hour after cloud stabilization of a 1 Mt burst, with the mission continuing for eight hours subsequent to the cloud transit. Author (GRA)

**N82-30930#** Naval Submarine Medical Research Lab., Groton, Conn.

**POSITION PAPER: THE TOXIC EFFECTS OF CHRONIC EXPOSURE TO LOW LEVELS OF CARBON DIOXIDE Interim Report**

19 Jan. 1982 46 p refs
(AD-A115053; NSMRL-973) Avail: NTIS HC A03/MF A01 CSCL 06/20

Numerous patrol studies have provided a sizable data base of levels of CO2 exposure and health problems encountered by Naval nuclear submariners. Humans have been exposed to a variety of concentrations of CO2 for chronic periods of time aboard submarines, as well as in laboratory environments. Mean data, PICO2 = 10 torr and 40 days, collectively represent this wide variety of CO2 exposures. Physiological responses to the CO2 environment were repeatedly documented, but toxic effects were not apparent. Human exposure tests were safely conducted in atmospheres containing up to 5 torr CO2, for up to 90 days. Such exposures are therefore considered safe at this time. Animal studies showed that chronic, low-level, CO2 exposures caused changes of the bone content of CO2, the bone content of calcium, the soft tissue content of calcium, and histological changes of the lung. These changes were found to be completely reversible upon discontinuance of the animal's exposure to CO2. The extrapolation of the animal data to humans is a current problem in the advancement of our understanding of the effects of CO2 on humans. GRA

**N82-30931#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

### A CORTICALLY IMPLANTABLE MULTIELECTRODE ARRAY FOR INVESTIGATING THE MAMMALIAN VISUAL SYSTEM

**M.S. Thesis**

George W. Gorman, III Dec. 1981 107 p refs
(AD-A115484; AFIT/GE/EE/81D-24) Avail: NTIS HC A06/MF A01 CSCL 06/16

The research conducted during this study is a continuation of the Tatman-Fitzgerald (DTIC AD A080378, AD A100763) fabrication and testing of an implantable, multiplexed, multielectrode array that will be used to record the bioelectric signals emitted from the visual cortex of a live, visually functional animal. Primary emphasis of this study is the investigation of passivation materials that can be used to protect the AFIT Multielectrode Array from the harsh cerbrospinal environment encountered inside the cranium. Secondary emphasis is placed on analyzing the electrical characteristics of an AFIT JFET, designing an improved multiplexing drive circuit, and testing the system equipment with an operational device. Author (GRA)

**N82-30932#** Los Alamos Scientific Lab., N. Mex.

### BIOLOGICAL AVAILABILITY OF NICKEL ARSENIDES: TOXIC EFFECTS OF PARTICULATE Ni5As2

L. R. Gurley, R. A. Tobey, J. G. Valdez, M. S. Halleck, and S. S. Barham (Mayo Clinic, Rochester, Minn.) 1981 29 p refs
Presented at the 21st Hanford Life Sci. Symp. on Biol. Availability of Trace Metals, Richland, Wash., 4-8 Oct. 1981
(Contract W-7405-eng-36)
(DE82-000580; LA-UR-81-2708; CONF-811035-1) Avail: NTIS HC A03/MF A01

The toxicity of nickel arsenides was studied to determine if fugitive nickel arsenides from an oil shale retort could pose a threat to personnel in the workplace or to other living organisms in the environment. Considerations of: oil shale retort operating conditions, oil shale elemental composition, nickel and arsenic physicochemical properties, and oil shale matrix structure suggest that nickel arsenides may be formed during the oil shale retorting process. Similarities between nickel subarsenide and nickel subsulfide and nickel subselenimide, both of which are known potent carcinogens, have caused concern that nickel arsenides may have adverse effects on biological systems. Five stable nickel arsenides and nickel arsenic sulfide are considered possible species for study. GRA

**N82-30933#** Wuerzburg Univ. (West Germany). Inst. fuer Toxikologie.

### INVESTIGATION ON THE CARCINOGENIC EFFECT OF TRICHLORETHYLENE BY INHALATION AND MECHANISMS OF METABOLIC BIOACTIVATION Final Report, May 1980

Dietrich Henschler Bonn Bundesministerium fuer Forschung und Technologie Mar. 1982 22 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-82-007; ISSN-0171-7618) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4.60

Trichloroethylene, one of the most frequently used solvents, was studied as a carcinogen on account of the chemical relationship to vinylchloride. To test this, systematic inhalation experiments were performed on three animal species (mice, rats, hamsters) at 100 ppm and 500 ppm, 6 h/day, 5 days/week for 18 months. In parallel the biochemical level was measured, providing insight into the mechanism of action of the compound. Macroscopic and microscopic evaluation of all tissues of the experimental animals after spontaneous death reveals no increase in the rates of benign and malignant tumors in the exposed group above the controls. In female mice, there is a dose related increase in the rate of malignant lymphomas which is, however, believed to be a nonspecific activation of virus infestation. The results show that long-term inhalation of trichloroethylene, even in high concentrations, renders no indication of a carcinogenic risk. The results of this investigation stand against the worldwide suspicion that trichloroethylene, a very frequently used solvent in the work area as well as in household environments, presents a carcinogenic risk. Author (ESA)

**N82-30934#** Environmental Protection Agency, Washington, D.C. Office of Noise Abatement and Control.

### DETAILED RESEARCH PLAN: CARDIOVASCULAR EFFECTS OF NOISE

Dec. 1981 83 p
(PB82-163379; EPA-550/9-81-104) Avail: NTIS HC A05/MF A01 CSCL 06S

The effects of long term (acoustical) noise exposure on the cardiovascular system, the best documented of the nonauditory physiological effects of noise and the greatest potential public health issue are discussed. A plan was developed which includes the following items: (1) a summary of what is known from short term and long term studies; (2) detailed multicomponent plans for animal experimental studies, human epidemiologic studies, and human experimental studies; (3) discussion of recent research; and (4) analysis of five options. It is estimated that if research proceeds according to this plan, decision points will occur in year 3, year 6 and year 8. GRA

**N82-30935#** Joint Publications Research Service, Arlington, Va.

### USSR REPORT. LIFE SCIENCES: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 19

4 Aug. 1982 101 p refs Transl. into ENGLISH of various RUSSIAN articles
(JPRS-81442) Avail: Issuing Activity

Numerous topics in the biomedical and behavioral sciences are discussed. Bionics, biotechnology, ecology, medical demography, physiology, and radiation biology are among the topics covered. For individual titles, see N82-30936 through N82-30938.

**N82-30936#** Joint Publications Research Service, Arlington, Va.

### NEW ASPECTS OF FUNCTIONAL SYSTEM THEORY

K. V. Sudakov *In its* USSR Rept. Life Sci.: (JPRS-81442) 4 Aug. 1982 p 59-73 refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 2, Feb. 1982 p 3-13

Avail: Issuing Activity

The psychology of human motivation is discussed. A functional system theory is examined which states that living beings are inscribed in the exogenous time and space continuum which can be separated into discrete quanta, each of which is formed by some need of the organism and leads to satisfaction of those needs. R.J.F.

**N82-30937#** Joint Publications Research Service, Arlington, Va.

### PLASTIC PROPERTIES OF MOTIVATION AS PRIME COMPONENT IN SYSTEMIC ORGANIZATION OF PURPOSEFUL BEHAVIORAL ACTS

A. V. Kotov and V. G. Zilov *In its* USSR Rept. Life Sci.: (JPRS-81442) 4 Aug. 1982 p 74-80 refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 2, Feb. 1982 p 17-21

Avail: Issuing Activity

The nature of corticofugal influences on the formation in animals of food and defense motivations were studied. Inhibitory effects resulting from the stimulation of the frontal cortex were noted, as well as more complex influences resulting from the simulation of the occipital region of the neocortex, namely the inhibition of avoidance reactions and alleviation of food behavior. R.J.F.

**N82-30938#** Joint Publications Research Service, Arlington, Va.

### SYSTEMIC MECHANISMS OF HUMAN SUBCONSCIOUS ACTIVITY

Ye. A. Umryukhim *In its* USSR Rept. Life Sci.: (JPRS-81442) 4 Aug. 1982 p 81-90 refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 2, Feb. 1982 p 88-95

Avail: Issuing Activity

A model of the systemic organization of the subconscious mechanisms of human behavior is given with emphasis upon man's intuitive learning. The experimental data which served as the basis of the analysis was obtained by means of a technique which made it possible to single out and examine the stages of human learning. R.J.F.

**N82-30939#** Naval Training Analysis and Evaluation Group, Orlando, Fla.

### IMPROVED PROCEDURES TRAINING THROUGH USE OF AIDS DEVELOPED FROM LEARNING GUIDELINES

Paul G. Scott, William C. McDaniel, and Richard Braby Feb. 1982 29 p refs
(AD-A113109; TAEG-TR-113) Avail: NTIS HC A03/MF A01 CSCL 05/9

This report describes the development of a procedural training aid for the SH-3 Aircraft Normal Start Checklist. The results of a comparative evaluation of the training aid with the traditional squadron materials used for procedures training are provided.
Author (GRA)

**N82-30940#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**PREDICTION OF SHORT TERM TRACKING TASKS USING AN OPTIMAL PILOT MODEL M.S. Thesis**
Patrick A. Mullen Mar. 1982 101 p refs
(AD-A115543; AFIT/GAE/AA/81D-21) Avail: NTIS HC A06/MF A01 CSCL 17/8

An optimal pilot model has previously been successful in predicting the long term tracking performance of a longitudinal air-to-air gunnery task. This study investigated modifications to the same pilot model to determine whether it could be used to successfully predict performance for a short term task. The same task, including a lead computing optical sight, was simulated on a hybrid computer. Three pilots flew three different aircraft configurations on the fixed-base simulator against a target driven to RMS accelerations of 3.5G and 5.0G by filtered, Gaussian noise. The target was at either 1000' or 3000' range. A comparison of the data generated by the human pilots versus that of the optimal pilot model showed moderate correlation for elevator deflection, lead angle and pitch rate. Overall, the optimal pilot model was less successful in predicting short term tracking performance than it was in predicting long term performance.
GRA

**N82-30941#** Naval Biodynamics Lab., New Orleans, La.
**PERFORMANCE TESTS FOR REPEATED MEASURES: MORAN AND COMPUTER BATTERIES**
Alvah C. Bittner, Jr., Robert C. Carter, and Michele Krause Nov. 1981 24 p refs
(AD-A115068; NBDL-81R012) Avail: NTIS HC A02/MF A01 CSCL 05/10

This investigation was directed at statistical baseline evaluation of nine tasks for suitability for repeated measures applications to environmental investigations. In the first study, tasks from Moran and Mefferd (1959) were administered to 18 subjects daily for 13 work days (Monday to Friday). In the second study, Carter and Sbisa (1981) computer battery tasks were administered daily to 17 subjects (12 in common with first study) for 15 work days. Examination of the means, variances, interday reliabilities and cross-task correlations led to the recommendation of four tasks for repeated measures applications Vertical Addition (Nv), Perceptual Speed (PS), Grammatical Reasoning (GR), and Flexibility of Closure (FC).
Author (GRA)

**N82-30942*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**SPACE TELESCOPE NEUTRAL BUOYANCY SIMULATIONS: THE FIRST TWO YEARS**
Fred G. Sanders Jun. 1982 126 p
(NASA-TM-82485; NAS 1.15:82485) Avail: NTIS HC A07/MF A01 CSCL 05H

Neutral Buoyancy simulations which were conducted to validate the crew systems interface as it relates to space telescope on-orbit maintenance and contingency operations is discussed. The initial concept validation tests using low fidelity mockups is described. The entire spectrum of proposed space telescope refurbishment and selected contingencies using upgraded mockups which reflect flight hardware are reported. Findings which may be applicable to future efforts of a similar nature are presented.
E.A.K.

**N82-30943*#** Martin Marietta Labs., Baltimore, Md.
**ALGAL CULTURE STUDIES RELATED TO A CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**
R. O. Radmer, O. Ollinger, A. Venables, and E. Fernandez Jul. 1982 37 p refs
(Contract NAS2-10969)
(NASA-CR-166375; NAS 1.26:166375) Avail: NTIS HC A03/MF A01 CSCL 06K

Studies with algal cultures which relate to closed ecological life support systems (CELSS) are discussed. A description of a constant cell density apparatus for continuous culture of algae is included. Excretion of algal by-products, and nitrogen utilization and excretion are discussed.
Author

**N82-30944*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**FMP STUDY OF PILOT WORKLOAD. QUALIFICATION OF WORKLOAD VIA INSTRUMENT SCAN**
J. R. Tolel (Harvard Univ.), M. Vivaudou, R. L. Harris, Sr., and A. Ephrath (Bell Labs., Piscataway) [1982] 6 p refs
(Contracts NCC1-23; NCC1-56)
(NASA-CR-169254; NAS 1.26:169254) Avail: NTIS HC A02/MF A01 CSCL 05H

Various methods of measuring a pilot's mental workload are discussed. Scanning the various flight instruments with good scan pattern and other verbal tasks during instrument landings is given special attention for measuring pilot workload. L.F.M.

**N82-30945#** Human Resources Research Organization, Alexandria, Va.
**HUMAN FACTORS AND ROBOTICS: CURRENT STATUS AND FUTURE PROSPECTS**
H. McIlvaine Parsons and Greg P. Kearsley Oct. 1981 28 p refs
(Contract DAAD05-81-M-C790)
(AD-A115042; HUMRRO-PP-6-81) Avail: NTIS HC A03/MF A01 CSCL 05/5

The purpose of this article is to introduce the human factors community to the field of robotics including current and future applications and needed areas of research. It also aims to explain to the robotics community why human factors engineering is important to this field.
GRA

**N82-30946#** Human Engineering Labs., Aberdeen Proving Ground, Md.
**A COMPARISON OF DISPLAY FORMATS FOR THE ELECTRONIC MASTER MONITOR AND ADVISORY DISPLAY SYSTEM Final Report**
Frank J. Malkin, Jon J. Fallesen, and Harry J. Reed Apr. 1982 31 p refs
(AD-A115127; HEL-TM-9-82) Avail: NTIS HC A03/MF A01 CSCL 14/2

A comparison of two sets of display formats for the Electronic Master Monitor and Advisory Display System (EMMADS) was conducted to determine the effect display format has no performance. Performance measures included accuracy of response and latency of response to a display of a fault, as well as error on a subsidiary tracking task. A subjective questionnaire was used to determine if pilot preferences exist for display format. The results indicated that there were no significant differences in any performance measure due to the display formats but that there was a significant difference in reaction time among the subsystems. The subsystem with only three alternative faults had a significantly lower reaction time than the two other subsystems with eight and ten alternatives each. Pilot preference tended to favor those formats which were simple, uncluttered, and which appeared to be least busy. GRA

**N82-30947#** Sandia Labs., Albuquerque, N. Mex.
**OVERVIEW OF A PROCEDURE FOR HUMAN-RELIABILITY ANALYSIS**
B. J. Bell and A. D. Swain 1981 10 p refs Presented at the ANS/EBS Top. Meeting on Probabilistic Risk Assessment, Port Chester, N. Y., 20 Sep. 1981
(Contract DE-AC04-76DP-00789)
(DE81-030816; SAND-81-1961C; CONF-810905-6) Avail: NTIS HC A02/MF A01

An overview of the procedure used in performing a human reliability risk assessment and reliability analysis for nuclear power plant personnel is given.
DOE

**N82-31887*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**WORKSHOP ON CLOSED SYSTEM ECOLOGY**
15 Jul. 1982 19 p refs Workshop held in Pasadena, Calif., 18-22 Jan. 1982
(NASA-CR-169280; JPL-Pub-82-64; NAS 1.26:169280) Avail: NTIS HC A02/MF A01 CSCL 06C

Self maintaining laboratory scale ecological systems completely isolated from exchanges of matter with external systems were demonstrated. These research tools are discussed in terms of their anticipated value in understanding (1) global ecological material and energy balances, (2) the dynamics of stability and instability in ecosystems, (3) the effects of man-made substances and structures on ecosystems, and (4) the precise requirements for dynamic control of controlled ecology life support systems (CELSS). N.W.

**N82-31888*#** Tufts Univ., Medford, Mass. Dept. of Physics.
**DIFFUSION MEDIATED LOCALIZATION ON MEMBRANE SURFACES**
David L. Weaver Aug. 1982 26 p refs
(Contract NCA2-OR785-201)
(NASA-CR-166386; NAS 1.26:166386) Avail: NTIS HC A03/MF A01 CSCL 07D

Using the model of a cell membrane of a spherical surface in which membrane components may diffuse, the rate of localization due to trapping under diffusion control has been estimated by computing an analytical expression for the mean trapping time including the possibilities of a trapping probability less than one and/or the establishment of an equilibrium at the trap boundary. Author

**N82-31889#** Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazoni.
**ELECTRON PARAMAGNETIC RESONANCE ASSIGNMENT: AN ANALYSIS OF METHODS USED FOR BIOLOGICAL SAMPLES [ANALISI DELLE METHODICHE PER MISURE DI EPR SU CAMPIONI BIOLOGICI]**
F. Ianzini and A. Rosi Mar. 1982 25 p refs In ITALIAN; ENGLISH summary
(ISS-T-82/2; ISSN-0390-6485) Avail: NTIS HC A02/MF A01

Sample conditioning methods for freeze-drying, homogenization and freezing, used for the electron paramagnetic resonance assessment of biological molecular activity in cells, tissues and fluids are described. The procedure based on 77 K freezing is found to be the most suitable for fluids and tissues analysis. Author (ESA)

**N82-31890#** Research Inst. of National Defence, Stockholm (Sweden). Inst. of Aviation Medecine.
**A TECHNIQUE FOR LONG-TERM MEASUREMENTS OF THYROID FUNCTION IN BEAGLE DOGS USING IODINE 125**
Ove Wilson, John M. Stone (California Univ., Davis), and D. Edwin Monty (Arizona Univ., Tucson) Dec. 1979 39 p refs Sponsored by Swedish Medical Research Council
(FOA-A-59003-H3) Avail: NTIS HC A03/MF A01

A procedure for measuring thyroid uptake and retention of I 125 is described. After a single dose of 1.85 MBq the thyroid retention curve can be followed for 3 to 6 months or more. Physiologic changes and experimental manipulations of thyroid function are observed by changes in the slope of the release curve. The form of the slope of the curve is useful for determining biological half life, evaluating changes in turnover, calculating release rate exponentials, and for analyzing iodine compartmental distribution. Backscatter and attenuation affect measurements of I 125 uptake more than measurements made with I 131. The major disadvantage of I 125 is the extent of its absorption in tissues, which is partially counterbalanced by backscatter from the tissues surrounding the thyroid. Backscatter in the Lucite neck phantom can exceed attenuation. Author (ESA)

**N82-31891#** Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Lab. Central.
**BIOCORROSION [BIOCORROSION]**
G. Dellemagne 1982 14 p refs In FRENCH Presented at Ecole Natl. Super. de Chim. Ecole d'Ete sur Corrosion et Protection des Metaux, Les Houches, France, Sep. - Oct. 1981
(SNIAS-821-551-105; DCQ/L-160.390/82) Avail: NTIS HC A02/MF A01

Microorganisms which cause biocorrosion, factors which favor their development, and detection and treatment of biocorrosion are discussed. It is impossible to eradicate traces of water, in which the organisms develop, from contaminating fuel tanks, so fuel should be kept as free of water as possible. Synthetic liners which inhibit organism growth, and which are chemically resistant to water and jet fuel are suggested. It is possible that potassium bichromate, and boron compounds are good fungicides and bactericides. Author (ESA)

**N82-31892#** Joint Publications Research Service, Arlington, Va.
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 16, NO. 4, JULY - AUGUST 1982**
20 Aug. 1982 162 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 97 p
(JPRS-81599) Copyright. Avail: Issuing Activity

Biological and medical tests conducted on animals and humans during and after manned spaceflights are reported. The following topics are discussed: psychological and physiological effects and changes, hemodynamic responses, nervous system and sensorimotor performance, neurological tests, cardiovascular system tests, biochemistry, developments in medical technology, and biological and physiological stress tests. For individual titles, see N82-31893 through N82-31921.

**N82-31893#** Joint Publications Research Service, Arlington, Va.
**MAIN DIRECTIONS AND PRINCIPLES OF PSYCHOLOGICAL EXPERTISE OF COSMONAUTS**
K. K. Ioseliani, A. L. Narinskaya, and Sh. R. Khisambeyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 1-8 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 4-8

Avail: Issuing Activity

Personality and psychological stability tests, used in the decision making of cosmonaut selection and the successful completion of their training are discussed. High demands are made on individual psychological, personality and professional qualities of cosmonauts to assure the reliability of the cosmonaut spacecraft system. The battery of psychological tests at the screening stage, routine and special certification and special training, aimed at selecting individuals whose psychological traits and personality make them eligible for professional work with specific space equipment, are outlined. E.A.K.

**N82-31894#** Joint Publications Research Survice, Arlington, Va.
**ANESTHESIA, SURGERY AND RESUSCITATION DURING MANNED SPACEFLIGHTS**
L. L. Stazhadze, I. B. Goncharov, I. P. Neumyvakin, V. V. Pogomolov, and I. V. Vladimirov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 9-13 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 9-12

Avail: Issuing Activity

Technical problems of spacecraft environments and the changes in the human body and how they effect medical aid aboard a manned spaceflight are discussed. In space flight anesthesia can be applied using methods as multicomponent balanced anesthesia and peridural anesthesia. Surgery and resuscitation can be performed, by procedures and methods that allow operations in an abacterial environment, correction of vital dysfunctions with the aid of artificial pulmonary ventilation, cardiac electrotherapy, and sorptive purification of body fluids. Various aspects of infusion treatment and first medical aid are discussed. E.A.K.

**N82-31895#** Joint Publications Research Service, Arlington, Va.
**REGIONAL HEMODYNAMIC CHANGES AFTER SPACEFLIGHTS LASTING UP TO EIGHT DAYS**
T. D. Vasilyeva, Kh. Kh. Yarullin, and V. I. Zhuyko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 14-20 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 12-17

Avail: Issuing Activity

Fourteen cosmonauts were exposed to rheographic examination before and after space missions, to measure the pulse blood filling, tone and elasticity of cerebral vessels, right lung and right leg vessels during tilt tests. Postflight examinations demonstrated distinct changes in the cerebral, pulmonary and peripheral circulation, indicating cardiovascular deconditioning. The greatest changes were seen in the tone of arteries, arterioles and veins of the brain hemispheres, vertebrobasilar system and the leg. The changes were reversible, requiring no special correction. The changes in different vascular compartments returned to normal in a nonuniform manner. E.A.K.

**N82-31896#** Joint Publications Research Service, Arlington, Va.
**EFFECT OF OPTOKINETIC STIMULATION ON OPERATOR'S FUNCTIONAL STATE AND PROFESSIONAL WORK CAPACITY**

L. N. Kornilova, S. L. Kravchenko, L. D. Smirichevskiy, and A. A. Belonogov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 21-25 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 17-20

Avail: Issuing Activity

The effects of optokinetic noise on the physiological and professional parameters of a trained operator was examined. The pattern and level of changes in the parameters depend on the initial sensitivity to optokinetic stimulation. It is shown that the optokinetic stimulus, which leads to operator activity impairment, especially in spatial orientation is significant to the impaired orderlines of analyzer function, and its prolonged presence in subjects who are optokinetically unstable causes motion sickness symptoms. E.A.K.

**N82-31897#** Joint Publications Research Service, Arlington, Va.
**DEHYDRATION THERAPY FOR SUBJECTS EXPOSED TO SIMULATED SPACEFLIGHT CONDITIONS**
L. L. Stazhadze, T. M. Demidova, Zh. M. Kudryashova, and L. G. Repenkova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-82599) 20 Aug. 1982 p 26-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - aug. 1982 p 20-24

Avail: Issuing Activity

The effect of intravenous injection of 20% mannitol in a dose of 1 g per kg body weight at a rate of 5 ml/min on the central circulation and cardiac contractile function was investigated. The infusions were performed on 18 healthy male volunteers, who participated in a head down tilt test, during the control period, on days 3, 7 and 14 of bed rest, and during the recovery. It was found that prolonged osmotherapy produced a clinically distinct dehydration effect without influencing central circulation, led to positive cardiodynamics, and an improvement of left ventricle contractile function. E.A.K.

**N82-31900#** Joint Publications Research Service, Arlington, Va.
**DYNAMICS OF FUNCTIONAL STATE OF HEAVY TRANSPORT HELICOPTER PILOTS IN THE COURSE OF FLIGHT SHIFT**

Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 42-45 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 30-32

Avail: Issuing Activity

Before and after flights about 300 crewmembers of heavy transport helicopters were examined, using psychophysiological and integral methods. During a flight shift the health state of helicopter pilots varies via three stages: habituation, initial decline, and distinct lassitude, with the latter developing after a five hour flight load. In order to increase human reliability in the pilot-helicopter system, it is advisable to allow four hours flight time during a flight shift onboard helicopters of the above type. In this case the pilot exposure to vibration effects will also be limited. The paper describes a maximally permissible spectrum of vibration velocity for a four hour exposure. Author

**N82-31901#** Joint Publications Research Service, Arlington, Va.
**CONTROLOGRAPHY USED FOR INTEGRAL ASSESSMENT OF MENTAL WORK CAPACITY**
K. K. Ioseliani, A. L. Narinskaya, and Sh. R. Khisambeyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 46-49 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 32-35

Avail: Issuing Activity

Human mental performance was evaluated with the aid of a contrologaph. Three groups with a high, medium, and low level of mental performance were detected. It was found that the method of contrology can be used to predict human capacity to perform complex operational functions. An integrated evaluation of mental performance by means of the contrologaphic technique was in good agreement with the results obtained by the traditional methods. Author

**N82-31902#** Joint Publications Research Service, Arlington, Va.
**SEISMOCARDIOGRAPHIC EVALUATION OF CONTRACTILE FUNCTION OF THE MYOCARDIUM OF HYPOKINETIC RATS**
V. I. Kuznetsov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 50-55 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v.16, no. 4, Jul. - Aug. 1982 p 35-38
Avail: Issuing Activity

Seismocardiograph (SCG) recording in rats was explored and SCG time and amplitude parameters were determined. The measurements were performed on normal rats and hypokinetic rats with an altered cardiac contractility. The SCG data obtained in hypokinetic rats were compared with the results derived from contractility studies by heart catheterization and subsequent calculation of contraction strength and velocity. It is shown that the data compared are similar on hypokinetic days one and five. This suggests that the seismocardiographic method of studying heart contractility function of rats is adequate for integral evaluations of the strength and velocity of cardiac contractions in chronic experiments. On hypokinetic days fifteen and thirty the data obtained by catheterization and seismocardiographically are at variance. This is attributed to muscle mass losses and variations in the rigidity of 'internal' bonding. Author

**N82-31903#** Joint Publications Research Service, Arlington, Va.
**MORPHOLOGY AND COAGULANT FUNCTION OF HUMAN BLOOD SYSTEM DURING LONG EXPOSURE TO LOW AMMONIA CONCENTRATIONS IN A SEALED ENVIRONMENT**

M. P. Kalandarova and L. S. Pochukayeva *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 56-59 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 39-4
Avail: Issuing Activity

A group of test subjects was kept in a chamber in which the ammonia concentrations 5.1 + or - 0.05 mg/cu m and 2.1 + or - 0.1 mg/cu m were maintained for 17 and 31 days, respectively; on days 22 and 38 the ammonia concentration was increased to 9.3 + or - 0.1 mg/cu m. During this exposure the norphological composition (red blood cells, hemoglobin, reticulocytes, platelets, white blood cells and their various types), as well as the coagulative-anticoagulative system (factor 4 of platelets, index of blood clot retraction, recalcification time, thrombin time, ethanol and protamine sulphate paracoagulation test, fibrinogen degradation products, fibrinolytic activity, and fbrinogen and prothrombin content) were investigated. The parameters characterizing hemopoiesis and status of the coagulative-anticoagulative system did not show any significant changes. However, a slight decrease in the counts of leukocytes, neutrophils, and eosinophils is of concern, because in space flight resistance to different infections declines. Author

**N82-31904#** Joint Publications Research Service, Arlington, Va.
**PERCUTANEOUS MEASUREMENT OF PARTIAL OXYGEN TENSION AND LOCAL BLOOD FLOW IN MAN DURING ORTHOSTATIC TEST**
O. Ye. Ozerova and Asyamolova *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 60-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 41-44
Avail: Issuing Activity

Using a Drager oximeter modified by a Clark polarographic electrode, transdermal measurements of partial pressure of oxygen (p sub td O2) and local blood flow (Q) were carried out in 46 test subjects during tilt test (20 min). As a result of blood redistribution, at minute 1 Q increased significantly in the lower body ($p<0.01$) and decreased in the upper body ($p<0.01$). Regardless of the sensor location, p sub td O2 increased in most cases. M.G.

**N82-31905#** Joint Publications Research Service, Arlington, Va.
**ACTIVITY OF RAT ADRENAL MEDULA AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
R. A. Kvetnansky *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 65-69 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm, Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 44-47

Avail: Issuing Activity

After a 18.5-day space flight on Cosmos-1129 rat adrenals were investigated for the concentration of catecholamines and activity of enzymes involved in their synthesis, i.e., tyrosne hydroxylase, dopamine-betahydroxylase, and phenyl ethanol amine-N-methyl transferase. It was found that inflight the sympatho-adreno-medullary system of rats was not exposed to a prolonged or strong stressogenic effect. Post--flight the rats showed an increased reactivity to the immobilization stress. Author

**N82-31906#** Joint Publications Research Service, Arlington, Va.
**STEREOLOGICAL ANALYSIS OF RAT BONE TISSUE AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
A. A. Prokhonchukov and V. S. Peschanskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4 Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 70-73 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 47-49
Avail: Issuing Activity

Stereological measurements of volume fractions ot 53 samples of compact and spong structures of bones of 15 rats were carried out. The measurements were performed on cortical lamellae, trabecules and lacunae, channels of osteons, and matrices of femoral, tibial and fibular bones of rats. Postflight no significant changes were seen in the above parameters as compared to the vivarium controls. During readaptation to 1 g a slight increase in the volume fraction of spongy bones was noted. M.G.

**N82-31907#** Joint Publications Research Service, Arlington, Va.
**CHANGES IN RAT TISSUE DEOXYRIBONUCLEOPROTEIN AND NUCLEIC ACIDS FOLLOWING FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
E. Misurova, R. A. Tigranyan, T. Sabova, and M. Praslicka *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 74-78 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 49-52

Avail: Issuing Activity

The concentration of polydeoxyribonucleotides and nucleic acids was measured in the spleen, thymus, liver, bone marrow and blood of rats flown for 18.5 days on Cosmos-1129. The exposure led to an increase in the polydeoxyribonucleotide content in the thymus and a decrease of the DNA and RNA concentration in the spleen and thymus. These changes returned to normal at R+6. Author

**N82-31908#** Joint Publications Research Service, Arlington, Va.
**MORPHOLOGICAL DISTINCTIONS OF MACACA RHESUS MONKEY THYROID UNDER NORMAL AND VARIOUS TYPES OF HYPOKINETIC CONDITIONS**
G. I. Plakhuta-Plakutina, Ye. A. Savina, G. S. Belkaniya, D. S. Tavadyan, N. P. Dmitriyeva, Ye. A. Amirkhanyan, and R. S. Smirnova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 79-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 52-58

Avail: Issuing Activity

Thyroid glands and C cells of Macaca rhesus were examined histologically, electron microscopically, and morphometrically. The examinations were performed on six intact and seven hypokinetic rhesus monkeys which were kept in a suspension device for two months, small cages for two months or in a head-down position (seven days in a horizontal position and then eleven days in a head-down position at -6 deg). The experiment with a diminished motor activity and a normal support function of the lower limbs (maintenance in small cages), in spite of its long duration, produced no structural changes in the parenchyma or C cells. The 18-day bed rest test was followed by a hypofunction of the thyroid gland, inhibition of hormonal synthesis, and secretion without distinct changes in C cells. Unlike previous experiments, the suspension study led to hyperplasia and hypertropy of C cells and increase of their nuclear volume. Activation of C cells can be regarded as an adaptive reaction aimed at stabilizing bone calcium. M.G.

**N82-31909#** Joint Publications Research Service, Arlington, Va.
**EFFECTS OF +G SUB X ACCELERATION AND ADEUTRON ON NUCLEI ACID CONTENT AND OTHER PARAMETERS OF MOUSE PERIPHERAL BLOOD**
M. I. Minkova, I. T. Nikolov, Ye. R. Datsov, T. P. Pantev, and V. B. Tenchova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 88-92 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 58-60

Avail: Issuing Activity

The effect of acceleration and adeturon, a radioprotector, on the content of nucleic acids and the count, composition and osmotic resistance of white and red blood cells was investigated. Male mice of the H strain were exposed to +20G sub x for 5 min. The above parameters were measured 1, 24, and 48 hours after the exposure. The nuclei acid content decreased significantly immediately after the exposure and tended to return to normal afterwards. The leucocyte count was increased during all observation periods, and the erythrocyte count was decreased 1 hour after the exposure. Osmotic resistance of white and red blood cells varied in a different manner after the exposure. Adeturon administered at optimal protective doses (300 mg/kg) modified regulatory mechanisms of the animal body. M.G.

**N82-31910#** Joint Publications Research Service, Arlington, Va.
**SIGNIFICANCE OF MAGNETIC FIELD PARAMETERS TO CHANGE IN EVOKED BIOELECTRIC ACTIVITY OF THE BRAIN**
N. P. Smirnova, L. D. Klimovskaya, and A. S. Dyakonov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 93-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 61-63

Avail: Issuing Activity

The effect of a constant uniform magnetic field of 0.1 to 1.6 T on the somatosensory potentials of the brain cortex and hypothalamus was investigated on nembutal anesthesized rats. The exposure increased the amplitude and modified the form of evoked potentials in both brain structures. The effect grew significantly with induction of the magnetic field. At every induction level changes in the evoked potentials of the hypothalamus were more distinct than those of the cortex. These findings were compared with the effects of a weakly pulsating magnetic field of the induction 0.1-0.4 T. Author

**N82-31911#** Joint Publications Research Service, Arlington, Va.
**CYTOGENETIC EFFECTS OF HIGH-ENERGY CHARGED PARTICLES**
R. D. Govorun, S. V. Vorozhtsova, and V. N. Gerasimenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. (JPRS-81599) 20 Aug. 1982 p 98-102 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 64-67

Avail: Issuing Activity

The cytogenetic effects of irradiation were investigated in the bone marrow and corneal epithelium of mice, human white blood cells, and Stamm V79-4 cells of Chinese hamsters exposed to protons with energy = 9.2 GeV, deutons and helium ions with energy = 4.6 GeV/nucleon. It was demonstrated that with an increase in the irradiation dose the number of aberrant cells and chromosome aberrations grew. A high yield of exchange type aberrations was found. The proliferative activity of cells of bone marrow decreased and its depletion occurred. The relative biological effectiveness coefficients of high-energy particles varied from 1.3 to 2.7 in relation to the cell type and parameters measured. R.J.F.

**N82-31912#** Joint Publications Research Service, Arlington, Va.
**CYTOGENETIC EFFECTS OF HEAVY CHARGED PARTICLES OF GALACTIC COSMIC RADIATION IN EXPERIMENTS ABOARD COSMOS-1129 BIOSATELLITE**
L. V. Nevzgodina and Ye. N. Maksimova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 103-108 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 67-71
Avail: Issuing Activity

An experiment was carried out on lettuce (Lactuca sativa) seeds flown in a biocontainer equipped with plastic detectors to record heavy charged particles (HCP). The purpose of the experiment was to determine the yield of aberrant cells as a result of irradiation, and to identify this effect as a function of HCP topography in the seed. The cytogenetic examination of flight seedlings revealed a significant difference between the seeds which were hit with HCP and those that remained intact. This indicates a significant contribution of the heavy component of galactic cosmic radiation into the radiobiological effect. The relationship between the radiobiological effect and the HCP topography in the seed was established: zones of the root and stem meristem proved to be the most sensitive targets. Author

**N82-31913#** Joint Publications Research Service, Arlington, Va.
**MEASUREMENT OF VESTIBULAR ASYMMETRY IN ROTATION TESTS**
T. A. Nalimova, A. B. Savinkov, and R. V. Kofanov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 109-111 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 71-72
22-51) Avail: Issuing Activity

In order to detect transient vestibular dysfunctions, a group of 30 workers who were regularly exposed to noise and vibration at work were examined. A control group of 15 subjects was also examined. Rotation to the left and right in a Barany chair with sudden stopping was used. Electronysthgmograms (ENG) were recorded. Differences between the parameters for the tested groups were not demonstrated. Differences between ENG recorded both before and after work failed to demonstrate differences. This finding demonstrates that there were no gross disturbances in the vestibular system. R.J.F.

**N82-31914#** Joint Publications Research Service, Arlington, Va.
**COMPARATIVE EVALUATION OF INFORMATIVENESS OF THREE CORRECTED ORTHOGONAL LEADS AND TWELVE CONVENTIONAL EKG LEADS IN CONDUCTING FUNCTIONAL TESTS**
V. D. Turbasov and Z. A. Golubchikova *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 112-116 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 72-75
Avail: Issuing Activity

Data pertaining to the comparative evaluation of electrocardiogram (EKG) information obtained through the use of 3 corrected orthogonal leads as opposed to 12 conventional EKG leads is given. Statistically significant differences were observed with respect to some parameters. It was concluded, however, that the resemblance of dynamics of EKG parameters in direct and synthesized leads indicates that the cordinate system of the later does not change appreliably tests, as compared to the coordinate system of direct coordinate system of direct EKG leads. R.J.F.

**N82-31915#** Joint Publications Research Service, Arlington, Va.
**DIAGNOSTIC USE OF ENZYMATIC TEST IN EXPERIMENTS ON MONKEYS**
G. S. Belkaniya and N. I. Lamondzhava *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, no. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 117-126 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 75-81
Avail: Issuing Activity

Standard data on serum activity of the three most widely used enzymes in clinical practices were analyzed, as was as the direction of enzymatic changes in the presence of various functional and pathological states in monkeys, in order to elaborate enxymodiagnostic criteria. Four hundred sixty one healthy monkeys were examined. R.J.F.

**N82-31916#** Joint Publications Research Service, Arlington, Va.
**SYSTEM FOR AUTOMATIC ANALYSIS OF RHEOENCEPHALOGRAMS**
I. V. Sokolova and Kh. Kh. Yarullin *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 127-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 81-83
Avail: Issuing Activity

The automation of rheoencephalogram (REG) processing is discussed. The method for REG analysis stipulates that the rheographic curve Reg(t) for the duration of the cardiac cycle (T) reflects pulsating fluctuations in volumetric filling of blood in the examined vascular zone is such a manner that it can be rendered in the form of the sum of two components, a(t) and b(t), reflecting volumetric pulsation of the arterial and venous systems, respectively. R.J.F.

**N82-31917#** Joint Publications Research Service, Arlington, Va.
**PREFLIGHT EXAMINATION RESULTS USED TO FORECAST COSMONAUT ENDURANCE OF ORTHOSTATIC TESTS AFTER SPACEFLIGHT**
V. A. Degtyarev, Yu. M. Dovzhenko, L. A. Larionova, V. G. Doroshev, and N. A. Lapshina *In its* USSR Rept: Space Biol. and Aerospce Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 131-135 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 83-85
Avail: Issuing Activity

The possibility of forecasting the postflight physical condition of cosmonauts in the readaptation period on the basis of preflight examination findings is discussed. R.J.F.

**N82-31918#** Joint Publications Research Service, Arlington, Va.
**RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM AND ELECTROLYTE METABOLISM IN RAT BLOOD AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
R. Kvetnansky, R. A. Tigranyan, A. Jindra, and T. A. Viting *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 136-138 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, No. 4, Jul. - Aug. 1982 p 85-87

Blood plasma aldosterone concentration and renin activity were studied in rats flow in space on the Cosmos 1129 satellite using radioimmunoassay techniques. Immediately after the flight, the animals presented significant decreases in plasma renin activity, as compared to rats in the vivarium control and animals in the synchronous experiment. R.J.F.

**N82-31919#** Joint Publications Research Service, Arlington, Va.
**EPINEPHRINE AND NOREPINEPHRINE CONCENTRATIONS IN RAT CARDIAC VENTRICLES AND ATRIA AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
R. Kvetnansky and R. A. Tigranyan *In its* USSR Rept: Space Giol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 139-142 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 87-89

Demonstrable concentrations of norepinephrine and epinephrine in tne four compartments of the myocardium of rats aboard the Cosmos 1129 satellite were analysed. Findings confirmed the hypothesis that there is elevation of the catecholamine level in the heart after spaceflights, probably due to the diminished functional load in weightlessness. Thus, this state is not a chronic stressor. However, some parts of the heart reacted to spaceflight by a drop in the norepinephrine level. R.J.F.

**N82-31920#** Joint Publications Research Service, Arlington, Va.
**RAT BLOOD PLASMA CORTICOSTERONE AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**
R. Kvetnansky and R. A. Tigranyan *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 16, no. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 143-145 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 16, no. 4, Jul. - Aug. 1982 p 89-90
Avail: Issuing Activity

The question of whether prolonged weightlessness is a chronic activator of the adrenal cortex was investigated. It was found that prolonged weighlessness is not a chronic activator. R.J.F.

**N82-31921#** Joint Publications Research Service, Arlington, Va.
**DEOXYRIBONUCLEOPROTEIN AND NUCLEIC ACID CONTENT OF RAT TISSUES AFTER FLIGHT ABOARD COSMOS-936 BIOSATELLITE**
E. Misurova, R. A. Tigranyan, K. Kropaceva, and M. Praslicka *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 16, No. 4, Jul. - Aug. 1982 (JPRS-81599) 20 Aug. 1982 p 146-150 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), V. 16, no. 4, Jul. - Aug. 1982 p 91-93

Avail: Issuing Activity

Changes in tissue levels of soluble polydeoxyribonucleopropeinsvin an artificial gravity (DDRN) environment aboard the Cosmos 936 biosatellite were studied. PDRN levels more than doubled in the spleen of rats submitted to weightlessness, as compared to vivarium and synchronous control groups. R.J.F.

**N82-31922*** National Aeronautics and Space Administration, Washington, D. C.
**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES**
Jul. 1982 111 p
(NASA-SP-7011(234); NAS 1.21:7011(234)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 356 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1982. Author

**N82-31923** Royal Naval Personnel Research Committee, London (England). Applied Psychology Unit.
**A TRIMIX SATURATION DIVE TO 660 METERS: STUDIES OF COGNITIVE PERFORMANCE, MOOD AND SLEEP QUALITY**
Robert H. Logie and Alan D. Baddeley Mar. 1982 24 p refs
(RPN-2/82; BR83533) Avail: Issuing Activity

An He-O2-N2 (Trimix) gas mixture was tested. Data were obtained from two divers on cognitive performance tests (arithmetic ability, grammatical reasoning, perceptual speed, visuo-spatial manipulation and semantic processing) during a simulated dive to 660 msw. At maximum depth there is a severe blanket impairment of ability to perform any of the tests. At shallower depths, impairments are not as marked, with performance at 300 msw close to that measured at surface pressure. Sleep quality is disrupted throughout the dive, with one subject affected more than the other. Mood patterns vary less systematically, with large individual differences. Low correlations between sleep quality and performance indicate that performance decrements are due almost entirely to breathing Trimix at high pressure. Author (ESA)

**N82-31924#** California Univ., Berkeley. Lawrence Berkeley Lab. Lighting Systems Research Dept.
**NEW LOOK AT MODELS OF VISUAL PERFORMANCE**
Robert Clear and Samuel Berman Jun. 1981 25 p refs Presented at the Illuminating Eng. Soc. Ann. Tech. Conf., Toronto, 9-13 Aug. 1981
(Contract W-7405-eng-48)
(DE82-001337; LBL-12496; CONF-810862-2) Avail: NTIS HC A02/MF A01

A discussion of the failure of a report on lighting recommendations to explicitly consider cost-effectiveness is presented. It is argued that in visual performance experiments, accuracy is as much a function of the relative worth of speed and accuracy as it is of visibility. In a task that consists of subtasks, such as comparing two lists, it may be necessary to explicitly model the effect of each subtask's visibility on speed and accuracy. Finally changes in print may be significant in that they can lead to changes in visual performance without a corresponding change in visibility. The current Commission Internationale de L'Elairage (CIE) model for visual performace CIE 19/2, does not consider the above factors. Althought it is believed that the CIE model is not useful as an application model, it is felt that the general features of the visibility/visual performance relationship are clear and are important to lighting design. DOE

**N82-31925#** Sandia Labs., Albuquerque, N. Mex.
**SNLA HOST-TO-HOST TRANSFER SYSTEM**
1981 36 p refs
(Contract DE-AC04-76DP-00789)
(DE82-000069; SAND-81-2071C; CONF-811045-1) Avail: NTIS HC A03/MF A01

A host to host system is used to transmit files or elements between an 1108 and 1100/82 via an intercomputer coupler. The software that implements the host to host capability is discussed. DOE

**N82-31926#** Los Alamos Scientific Lab., N. Mex.
**MEDICAL USES OF ACCELERATORS**
James N. Bradbury 1981 50 p refs Presented at the 6th Intern. Summer Coll. on Phys. and Contemporary Needs, Islamabad, Pakistan, 15 Jun. 1981
(Contract W-7405-eng-36)
(DE82-000572; LA-UR-81-2805; CONF-8106159-1) Avail: NTIS HC A03/MF A01

Particle accelerators and their uses in connection with medically-related research, diagnosis, and treatment are discussed. For cancer radiotherapy, nuclear particles including protons, neutrons, heavy ions, and negative pi mesons have advantages compared to conventional radiations in terms of dose localization and/or biological effectiveness. Clinical evaluations of these particles are underway at a number of institutions. Accelerator-produced radionuclides are in widespread use for research and routine diagnostic purposes. Elemental analysis techniques with charged particles and neutrons are being applied to bone, blood, and other tissues. Finally, low-dose medical imaging can be accomplished with accelerated protons and heavy ions. The status and future of these programs are discussed. DOE

**N82-31927#** Sandia Labs., Albuquerque, N. Mex.

**IMPLANTABLE, REMOTELY-PROGRAMMABLE INSULIN INFUSION SYSTEM**

G. A. Carlson, Raymond E. Bair, John I. Gaona, Jr., Jerry T. Love, and Ruben S. Urenda Oct. 1981 43 p refs
(Contracts DE-AC04-76DP-00789; AT(29-1)-789; Grant NIH-HD-11327-01)
(DE82-003084; SAND-81-2152) Avail: NTIS HC A03/MF A01

An implantable, remotely programmable insulin infusion system which has a mass of 280 grams and an implanted lifetime exceeding 2 years is described. The system uses a rotary solenoid-driven peristaltic pump controlled by low power CMOS timing circuitry which provides bimodal insulin delivery. Fifteen low rates from 0.39 to 5.9 units/hour and 15 high doses from 0.84 to 12.5 unis using U100 insulin are available. GRA

**N82-31928#** California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Biophysics.

**FLUID DISTRIBUTION IN PROGRESSIVE PULMONARY EDEMA: A LOW-TEMPERATURE SCANNING ELECTRON MICROSCOPY STUDY Ph.D. Thesis**

Gregory Ross Hook Jun. 1981 100 p refs
(Contract W-7405-eng-48)
(DE82-002554; LBL-11516) Avail: NTIS HC A05/MF A01

High pressure pulmonary edema, a common medical disorder caused by venous hypertension following left ventricular heart failure, is discussed. Abnormal fluid accumulation in the alveolar air spaces results in a life threatening loss of respiratory function. The primary component of the fluid is water and therefore the study of water distribution in the alveolus can provide insight into high pressure pulmonary edema pathology. The new method of freeze fracture low temperature scanning electron microscopy (SEM) developed and applied to the study of pulmonary edema. This method combines freeze fracture sample preservation with SEM observation and retains pulmonary fluids in the frozen hydrated state for direct three dimensional SEM imaging of alveoli. Quantitative measurements of alveolar structures resulting from high pressure pulmonary edema were made from SEM micrographs. From these measurements a model for alveolar fluid distribution resulting from progressive high pressure edema was made. DOE

**N82-31929#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.

**PROBABILISTIC METHODOLOGY FOR ESTIMATING RADIATION INDUCED CANCER RISK**

D. E. Dunning, Jr., R. W. Leggett, and L. R. Williams 1981 7 p
Presented at the ANS/ENS Topical Meeting on Probabilistic Risk Assessment, Port Chester, N.Y., 20 Sep. 1981
(Contract W-7405-eng-26)
(DE82-001474; CONF-810905-22) Avail: NTIS HC A02/MF A01

A computer code was developed to provide a versatile and convenient methodology for radiation risk assessment. The code allows as input essentially any dose pattern commonly encountered in risk assessments for either acute or chronic exposures, and this includes consideration of the age structure of the exposed population. Results produced by the analysis include the probability of one or more radiation-induced cancer deaths in a specified population, expected numbers of deaths, and expected years of life lost as a result of premature fatalities. These calculations include consideration of competing risks of death from all other causes. The program also generates a probability frequency distribution of the expected number of cancers in any specified cohort resulting from a given radiation dose. The methods may be applied to any specified population and dose scenario. DOE

**N82-31930#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**NONINVASINE TECHNIQUES FOR CARDIOVASCULAR EXAMINATION OF INTEREST IN AEROSPACE MEDICINE [TECHNIQUES NON-SANGLANTES DE L'EXPLORATION CARDIO-VASCULAIRE INTERET EN MEDECINE AEROSPATIALE]**

R. Carre May 1982 205 p refs In FRENCH
(AGARD-AG-277(FR); ISBN-92-835-2109-9) Avail: NTIS HC A10/MF A01

In addition to standard electrocardiography and cardiac radiography, other noninvasive cardiological techniques used in the evaluation of pilots include the Holter technique, echocardiography, ultrasonics, and isotopic exploration. Special tests of interest in aerospace medicine are cardiac rheoplethymyopathy with measurement of systolic period intervals, ballistocardiography, tests of lower body negative pressure, and tests using the tilt-table and the centrifuge. For individual titles, see N82-31931 through N82-31943.

**N82-31931#** Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

**PRINCIPAL ELECTROCARDIOGRAPHIC ANOMALIES IN THE EVALUATION OF PILOTS [PRINCIPALES ANOMAIES ELECTROCARDIOGRAPHIQUES DANS L'EXPERTISE DU PERSONNEL NAVIGANT]**

R. Carre, A. Didier, and H. Ille *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 1-4 refs In FRENCH

Avail: NTIS HC A10/MF A01

The cardiovascular system is the sysem most influenced by stress during the flight of high performance aircraft such as the Mirage 2000 or 4000 type. Military regulations covering the physical fitness of pilots requires absolute organic and functional integrity of the circulatory system and an electrocardiogram with six peripheral and precordial derivations is obtained at each evaluation of pilots of such aircraft. Unfitness is easily pronounced for rhythm problems, flutter, auricular fibrillation, trouble in condition, complete right or complete left bundle branch block, and effects of myocardial infraction. Electrocardiograms are discussed with focus on: (1) rhythm irregularities; (2) incomplete right bundle branch block; (3) left axial deviations and their relation to the left anterior hemiblock concept; the Wolf Parkinson White syndrome; and (5) irregularities of ventricular polarization. Trans. by A.R.H.

**N82-31932#** Hopital d'Instruction des Armees, Paris (France).

**VENTRICULAR PREEXCITATION SYNDROMES [LES SYNDROMES DE PRE-EXCITATION VENTRICLAIRE]**

J. Droniou *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 15-25 refs In FRENCH
Avail: NTIS HC A10/MF A01

Ventricular preexcitations constitute a group of conduction anomalies involving the premature activation of all or part of the ventricule by normal sine wave excitation.They can be asymptomatic, reduced to their electrocardiograph signatures alone or complicated with arrhythmias, which are often serious. The asymptomatic forms are the source of difficulties in the evaluation of pilots for two reasons: certain electrocardiograph anomalies suggestive of preexcitation do not have an unambiguous signification, and the prognosis is not easily predicted. Transl. by A.R.H.

**N82-31933#** Service de Medecine Aeronautique, Versailles (France).

**THE EXERCISE ELECTROCARDIOGRAM [ELECTROCARDIOGRAMME D'EFFORT]**

G. Leguay and A. Seigneuric *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 27-66 refs In FRENCH

Avail: NTIS HC A10/MF A01

The physiological basis of exercise electrocardography (EKG) is reviewed with emphasis on muscular contraction, maximum oxygen consumption, pulmonary exchanges, and the adaptation of circulation and of the heart to exercise. Indications and contrdications for the use of stress tests are discussed. The types, placement, and fixation of electrodes are among the basic techniques of exercise EKG described. Modalities of exercise are considered. Normal exercise EKG in coronary insufficiency, the diagnostic value of exercise EKG in cronary insufficiency, the use of the EKG as a criteria in determining severity of coronary insufficiency, and the prognostic value of stress EKG's are examined. Transl. by A.R.H.

**N82-31934#** Service de Medecine Aeronautique, Versailles (France).

**CONTINUOUS ECG REGISTRATION ACCORDING TO THE HOLTER METHOD [ENREGISTREMENT CONTINU DE L'E.C.G. SELON LA METHODE DE HOLTER]**

G. Leguay and A. Seigneuric *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 67-86 refs In FRENCH

Avail: NTIS HC A10/MF A01

In 1949, Holter implemented a process which allows for the continuous recording of ECG's during ambulation. This process not only permits almost instantaneous knowledge of the electrical activity of the heart but also allows for modification of certain concepts, particularly with regards to arrhythmia. With constant improvement, this method presents two large centers of interest to cardiology: rhythm problems and the supervision of their treatment, and the repolarization problem. The technical modalities of the method are reviewed and implications for cardiology are summarized in order to suggest aspects of interest in aerospace medicine. Transl. by A.R.H.

**N82-31935#** Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

**THE CONTRIBUTION OF STANDARD RADIOGRAPHY IN CARDIOVASCULAR EXPLORATION DURING THE EXAMINATION OF PILOTS [APPORT DE LA RADIOGRAPHIE STANDARD DANS L'EXPLORATION CARDIO-VASCULAIRE AU COURS DE LA VISITE DU PERSONNEL NAVIGANT]**

M. Puech and P. J. Metges (Hopital d'Instruction des Armees) *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 87-92 refs In FRENCH

Avail: NTIS HC A10/MF A01

Teleradiography of the heart and televised radiography are integrated and articulated in complementary cardiologic examinations. Nonbloody radiological techniques and their normal results are described as well as their contribution in a number of pathological situations usually encountered which can pose problems of fitness. Congenital cardiopathy, acquired valvular cardiopathy, and ischemic and obstructive cardiopathies are discussed as well as physiological factors affecting the size and shape of the heart in athletes and Africans. Transl. by A.R.H.

**N82-31936#** Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

**THE CONTRIBUTION OF CARDIAC MECHANOGRAMS IN THE EVALUATION OF PILOTS [APPORT DES MECANOGRAMMES CARDIAQUES DANS L'EXPERTISE DU PERSONNEL NAVIGANT]**

R. Carre, R. Amoretti, A. Didier, and H. Ille *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 93-112 In FRENCH

Avail: NTIS HC A10/MF A01

The idea of graphically registering carotid pulsations or the apexogram is not recent, having been used in the nineteenth century by Chaveau, Marey, and Maceray. If such recordings were valuable to physiologists, they have beon of little value to clinicians and experts on pilots. These nonbloody techniques are easily reproducible at each examination and tracings can be included in the pilot's file for comparison from one examination to another. Cardiac mechanograms provide three classes of information: (1) analysis of the heart murmur, indicates the variety of cardiopathology by phonocardiography; (2) the study of arterial distensibility by the carotidogram; and (3) chronocardiographic measure by the study of systolic intervals, permitting determination of the value of myocardial muscle contraction. Transl. by A.R.H.

**N82-31937#** Hopital d'Instruction des Armees, Paris (France).

**ECHOCARDIOGRAPHY IN THE EXAMINATION OF PILOTS [L'ECHOCARDIOGRAPHIE DANS L'EXPERTISE DU PERSONNEL NAVIGANT]**

J. Droniou and A. Coignard *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 113-143 In FRENCH

Avail: NTIS HC A10/MF A01

Echocardiography permits visualization of intracardiac structures thanks to the reflection of an ultrasonic beam by these structures. Introduced into the clinic in the 1950's, this technique has made an extraordinarily rapid advance, to the point of becoming an indispensable requirement in cardiologic examination. Its nonagressive character and its relative simplicity in operation, warrants repetition of the examination at will. Its sensitivity and reliability in experienced hands should give it an important place in the cardiological evaluation of pilots. Transl. by A.R.H.

**N82-31938#** Hopital d'Instruction des Armees, Versailles (France).

**EXAMINING ARTERIAL FUNCTION BY DOPPLER VELOCIMETRY: THE ADVANTAGE IN AEROSPACE MEDICINE [EXPLORATION FONCTIONNELLE ARTERIELLE PAR VELOCIMETRIE DOPPLER INTERET EN MEDECINE AERONAUTIQUE ET SPATIALE]**

A. Didier, H. Ille, C. Ribadeau-Dumas, Ph. Lantrade, and Ch. Hiltenbrand *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 145-158 refs In FRENCH

Avail: NTIS HC A10/MF A01

Since the work done by Satomura and Kato in Japan in the 1960's, the use of the Doppler effect to measure the rate of blood flow in vessels has developed and met with considerable success, particularly in France. It has become a routine examination in angiology. The précision of the data obtaind and the total innnocuousness of this investigative method requires that its place be defined in aeronautical and aerospace medicine fór the medical evaluation of pilots as well as for the study of the physiological modification of arterial flow in organisms subjected to actual aeronautical and space constraints. Transl. by A.R.H.

**N82-31939#** Hopital d'Instruction des Armees, Paris (France).

**CONTRIBUTION OF NUCLEAR MEDICINE IN CARDIOLOGY [APPORT DE LA MEDECINE NUCLEAIRE EN CARDIOLOGIE]**

J. F. Gaillard *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 159-166 refs In FRENCH

Avail: NTIS HC A10/MF A01

Isotopic exploration techniques have a practically undeniable place among complementary cardiological examinations. In 1948 a radiocardiogram was introduced which recorded by external detection the dilution curve in cardiac cavities using a radioactive detector. Static scintigraphy appeared in 1964, and in the 1970's, the gamma camera was coupled with a computer to permit rapid dynamic studies with image processing. Benefitting from the same electronic progress and the same image reconstruction algorithm as tomodensitometry, gamma emission tomography obtained results in studies of vascularization and metabolism of the myocardium. Isotopic methods furnish data which, for the most part, were obtained only by bloody radiological explorations using the products of contrast and ultrasonics. Nuclear medicine is

interested in the noninvasine functional study of an organ and the possibility of quantifying organ function and of describing it by curves, graphics, and images. To the expert, nuclear medicine is important because of the noninvasive character of most of the techniques used. Those techniques having an invasive character which are excluded in the initial step in pilot evaluation are cited.
Transl. by A.R.H.

**N82-31940#** Rome Univ. (Italy). Inst. Universitaire de Medecine Aerospatiale.

**BALLISTOCARDIOGRAPHY: A NONINTRUSIVE METHOD MOVING TOWARDS CLINICAL APPLICATIONS [LA BALLISTOCARDIOGRAPHIE: UNE METHODE NON-INTRUSIVE AVANCANT VERS DES APPLICATIONS CLINIQUES]**

A. deScano *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 167-181 refs In FRENCH
Avail: NTIS HC A10/MF A01

Ballistocardiography (BCG) can be defined as a noninvasive experimental method of recording and studying periodic accelerations of the mass of a body due to the reaction of inertial which it represents at each ventricula systole. The typical sequence of waves which constitutes BCG markings differ quantitatively according to the axis of the body (and also according to the state of repose and physical exercise), the age and pathological conditions of the body, and/or the large arterial vessels. The evolution of BCG from work one by J.W. Gordon in 1877 to the present is reviewed. Physiological factors determining the characteristics of the tracings, possible uses in detecting coronary disease and myocardial infaction, and research into three dimensional BCG and applications in microgravity environments are discussed.
Transl. by A.R.H.

**N82-31941#** Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).

**THE ADVANTAGE OF THE TILT TABLE TEST IN EXAMINING CIRCULATORY FUNCTION [INTERET DU TEST A LA TABLE BASCULANTE EN EXPLORATION FONCTIONNELLE CIRCULATOIRE]**

J. Timbal *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 183-190 refs In FRENCH
Avail: NTIS HC A10/MF A01

Although asking the subject to change position (rise from bed and stand immobile) is the simplest means of evaluate the transition from clinostatism to orthostatism, the results obtained are difficult to standardize because the calling into action of muscles affects the circulatory condition. The tilt table can be used evaluate objectively the rapidity and efficiency of cardiovascular reactions by modifying the application of the force of gravity. Short term effects during the transition from the horizontal to the vertical position are considered with respect to their value in examinations of circulatory function. The use of the tilt table in the selection of astronauts and in determining physical fitness is discussed and possible reasons for not using this method systematically are offered.
Transl. by A.R.H.

**N82-31942#** Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge (France).

**THE ADVANTAGE OF THE LOWER BODY NEGATIVE PRESSURE TEST IN AEROSPACE MEDICINE [INTERET DU TEST LOSER BODY NEGATIVE PRESSURE EN MEDECINE AEROSPATIALE]**

B. Vettes and H. Viellefond *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 191-194 refs In FRENCH
Avail: NTIS HC A10/MF A01

The study of the physiopathological effects of weightlessness is not easy since these effects appear only when the human organism escapes the attractive forces of Earth. It is necessary to resort to simulation to examine the functions of the different physiological systems implicated. Simulation of the incidence of weightlessness on the cardiovascular system shows that physiopathological effects appear very early leading to a new distribution of blood volume. So-called orthostatic tests reveal interesting elements of hemodynamic response. The tests actually provide two classes of blood volume repartition conforming to that observed during prolonged space flight and during the return to Earth. Some tests such as those carried out on a tilt table during long duration bed rest involve modification of the posture of the entire organism. Other tests simulate the difference of ambient pressure between the upper nd lower parts of the body by creating a mobilization of the blood volume in regions where ambient pressure is weakest.
Transl. by A.R.H.

**N82-31943#** Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge (France).

**TECHNIQUES FOR CARDIOVASCULAR EXAMINATION IN HUMAN CENTRIFUGES AND THE PRINCIPAL RESULTS OBTAINED [LES TECHNIQUES D'EXPLORATION CARDIOVASCULAIRE EN CENTRIFUGEUSE HUMAINE ET LES PRINCIPAUX RESULTATS OBTENUS]**

B. Vettes and H. Viellefond *In* AGARD Noninvasine Tech. for Cardiovascular Exam. of Interest in Aerospace Med. May 1982 p 195-203 refs In FRENCH
Avail: NTIS HC A10/MF A01

Sustained Gz and Gx accelerations have an undeniable effect on the cardiovascular system and consequently the use of a human centrifuge must always be made under strict surveillance of cardiovascular function, preferably using noninvasive techniques. The use of phonocardiography, electroplethysmography, rheoplethysmography, and pneumatic devices to record heart rate, arterial and venous pressure, and cardiac and local debits is described. The number and placement of the electrodes and the tracins obtained in electrocardiography are discussed as well as methods for determining peripheral light loss and central light dim as indications of hemodynamic tolerance as reflected in the visual field. The value of the centrifuge in studying the effectiveness of anti-g suits is also assessed.
Transl. by A.R.H.

**N82-31944*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**EFFECT OF SYNTHESIZED PROPELLER VIBRATION ON PASSENGER ANNOYANCE IN A TURBOPROP INTERIOR NOISE ENVIRONMENT**

Sherman A. Clevenson Aug. 1982 20 p refs
(NASA-TM-84515; L-15298; NAS 1.15:84515) Avail: NTIS HC A02/MF A01 CSCL 05H

The effect of synthesized propeller vibration on passenger annoyance to aircraft noise was investigated in passenger ride quality apparatus. Passenger reactions of annoyance to a wide range of potential turboprop interior noise environments were obtained under three simulated vibration conditions: no vibration, armrest vibration, and armrest plus cabin vibration. The noises, ranging from 71 to 95 dB(A) consisted of a turbulent boundary layer with a factorial combination of five blade passage frequencies (50 to 200 Hz), two harmonic roll offs, and three tone to noise ratios. Results indicate that passenger annoyance to noise in the presence of armrest vibration did not significantly change. However, those passengers exposed to cabin plus armrest vibration while being exposed to noise lower rating for the combined cabin vibration and noise environment compared with the rating for the noise along environment. This result is predicted by the ride quality model.
S.L.

**N82-31945#** Royal Aircraft Establishment, Farnborough (England).

**THE AIRLINE PILOT'S VIEW OF FLIGHT DECK WORKLOAD A PRELIMINARY STUDY USING A QUESTIONNAIRE**

G. A. Ellis and A. H. Roscoe Feb. 1982 26 p refs
(RAE-TM-FS(B)-465; BR83316) Avail: NTIS HC A03/MF A01

A self-administered questionnaire was distributed to 116 civil airline pilots in order to establish pilots' views on workload as a concept and from the viewpoint of their own flying task. Of the 98 questionnaires returned, 80% indicated that pilots think of workload as being related to effort. Several pilots differentiate between subjective and objective workload. The marked diversity

of opinion as to the workload associated with various tasks or flight phases, e.g., landing or radio communication, is highlighted.
Author (ESA)

**N82-31946#** Systems Research Labs., Inc., Dayton, Ohio.
**THE EFFECTS OF COLOR AND CONTRAST ON TARGET RECOGNITION PERFORMANCE USING MONOCHROMATIC TELEVISION DISPLAYS M.S. Thesis**
Alan R. Pinkus Wright-Patterson AFB, Ohio AMRL May 1982 46 p refs
(Contract F33615-79-C-0503; AF Proj. 7184)
(AD-A116238; AFAMRL-TR-82-9) Avail: NTIS HC A03/MF A01 CSCL 05/10

White, green, and red monochromatic television phosphors are used in a variety of military display systems, without consideration to their potential effect on an operator's target recognition performance. Since display contrast is known to have a significant effect on target recognition performance, it was also included as a variable to examine possible interaction effects. Target recognition performance was operationally defined as the visual angle (degrees) subtended by a group target, viewed via a television, at the time of recognition. Each of the twelve subjects viewed five different types of targets at four diagonal orientations, each under six television display conditions. For each trial, the target (located in the center of the television) started small and unrecognizable, then slowly enlarged until it became recognizable. At the moment of recognition, the subject pressed a projector stop button and identified the target. The experimenter then measured the target's size. Results showed that color did not significantly affect subject's target recognition performance ($p = 0.25$). Contrast was highly significant ($p < 0.001$), thereby replicating several previous studies. There was no color by contrast interaction ($p = 0.70$), but targets and color by targets were significant ($p < 0.0001$ and $p < 0.02$, respectively). GRA

**N82-31947#** Rockwell International Corp., El Segundo, Calif.
**AIRCREW WINDBLAST PROTECTION CONCEPTS, DEVELOPMENT AND EVALUATION Final Report, Oct. 1979 - Jun. 1980**
R. J. Cummings and W. J. Adams Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Mar. 1982 86 p refs
(Contract F33615-79-C-0528; AF Proj. 7231)
(AD-A115424; NA-80-390; AFAMRL-TR-80-123) Avail: NTIS HC A05/MF A01 CSCL 01/3

The problem of protecting aircrews from limb injuries during high-speed ejection is addressed. Design criteria, data, and evaluation techniques that were developed to support the selection of an appropriate windblast protection device concept for the F-15 and F-16 fighter aircraft are described in detail. Several alternate arm and leg-restraint systems were designed, fabricated, and evaluated as part of the research effort. Test fixtures were designed and fabricated to simulate (1) cockpit geometry, (2) force relationships between the seat and man, (3) deployment and retraction of restraints in 0.1 second, and (4) seat/man separation dynamics. The evaluation of restraint concept performance using the prototypes, evaluation plan, and test fixtures is described. The selection criteria to identify the best restraint designs are presented. A test and evaluation plan for airworthiness verification is described to aid follow-on engineering development efforts.
Author (GRA)

**N82-31948#** Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
**LIFE-CYCLE COSTING OF LIFE SUPPORT EQUIPMENT Final Report, Apr. - Sep. 1980**
Clifford C. Petersen, Colin L. Moodie, Jack Posey, Gary Schulties, and Jhitang Chen Dec. 1981 78 p
(Contract F33615-78-C-0627; AF Proj. 7930)
(AD-A116404; SAM-TR-81-25) Avail: NTIS HC A05/MF A01 CSCL 06/11

A feasibility study has been accomplished on applying life-cycle costing (LCC) to aircrew life support equipment (LSE). The AFLC Logistics Support Cost (LSC) model was examined and found to be too complex for application to life support devices (LSD). A potentially useful simplification of the LSC model was developed and applied to the CRU-68 oxygen regulator and the FR139 and FR140 anti-G valves, but available logistics data were insufficient for these devices. An alternate model (LCC-LSD) was developed and applied with some success. The simpler computer program requires data much more accessible from the DO41, DO39, and DO62 data systems and has a plotting capability to graph LCC vs. changes in reliability or maintainability. Sensitivity analyses showed maintenance costs to be the key area where the U.S. Air Force could achieve significant savings (perhaps $15 million).
Author (GRA)

**N82-31949#** Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
**SUPERVISORY CONTROL: PROBLEMS, THEORY AND EXPERIMENT FOR APPLICATION TO HUMAN-COMPUTER INTERACTION IN UNDERSEA REMOTE SYSTEMS Technical Report, 1 Feb. 1981 - 31 Jan. 1982**
Thomas B. Sheridan 1 Mar. 1982 144 p refs
(Contract N00014-77-C-0256; NR Proj. 196-158)
(AD-A116236) Avail: NTIS HC A07/MF A01 CSCL 17/2

This technical report provides an overview of a four-year theoretical and experimental research project on human-computer cooperation in remote control of undersea manipulators and vehicles. The report puts forth a theoretical framework for viewing supervisory control in terms of a hierarchical interaction of three fundamentally different types of control loops: (1) interaction of a human supervisor with a high level computer; (2) interaction between the high level and one or more low level computers; and (3) interaction of the low level computers with the environment as mediated through artificial sensors and effectors. The perspective is one of coordinated allocation of human and artificial resources to various functions at various levels and times within given tasks. Numerous problems are discussed in conjunction with human and computer cognition, display, command and control, matching capabilities to tasks and evaluation aspects. Experiments performed in our laboratory on human supervisory control of remote undersea manipulators, vehicles and dynamic processes are reviewed briefly in relation to the theoretical constructs. These draw upon already published detailed reports of each experiment. Author (GRA)

**N82-31950#** Sheffield Univ. (England). Dept. of Control Engineering.
**THE BENCH MINING SYSTEM: PROGRESS IN TWO-DIMENSIONAL SIMULATION OF STEERING CHARACTERISTICS**
J. B. Edwards Mar. 1982 19 p
(RR-176) Avail: NTIS HC A02/MF A01

Computer programs which simulate the vertical steering characteristics of the thick seam bench mining system were adjusted, in order to eliminate unwanted penetration of the floor. A flow chart which describes program functions needed to obtain bench fit is presented. Results for a variety of floor profiles confirm the validity of the fitting routines, so these routines were incorporated into color graphics simulation programs. Effects of interaction between roof support and bench can be incorporated into the simulation routine. Roof support and roof beam fitting routines work well for chocks with a very short front extension, but less well for long based chocks.
Author (ESA)

**N82-31951#** Research Inst. of National Defence, Stockholm (Sweden).
**READING TEXT FROM VISUAL DISPLAY UNITS**
Yvonne Waern and Carl Rollenhagen (Stockholm Univ.) May 1982 38 p refs
(FOA-C-53006-H2) Avail: NTIS HC A03/MF A01

Psychological aspects of reading are reviewed, and problems faced by good readers who are unfamiliar with computers, but who have to work with visual display units (VDU) are discussed. Text processing theories and psychological investigation methodologies for factors affecting VDU operator performance are examined.
Author (ESA)

**N82-31968*#** SKF Technology Services, King of Prussia, Pa. Technology Services Div.
**HIGH SPEED CYLINDRICAL ROLLER BEARING ANALYSIS. SKF COMPUTER PROGRAM CYBEAN. VOLUME 2: USER'S MANUAL Final Report**
G. J. Dyba and R. J. Kleckner Jun. 1981 147 p refs
(Contract NAS3-22690)
(NASA-CR-165364; NAS 1.26:165364; SKF-AT81D049-Vol-2)
Avail: NTIS HC A07/MF A01 CSCL 09B

CYBEAN (CYlindrical BEaring ANalysis) was created to detail radially loaded, aligned and misaligned cylindrical roller bearing performance under a variety of operating conditions. Emphasis was placed on detailing the effects of high speed, preload and system thermal coupling. Roller tilt, skew, radial, circumferential and axial displacement as well as flange contact were considered. Variable housing and flexible out-of-round outer ring geometries, and both steady state and time transient temperature calculations were enabled. The complete range of elastohydrodynamic contact considerations, employing full and partial film conditions were treated in the computation of raceway and flange contacts. The practical and correct implementation of CYBEAN is discussed. The capability to execute the program at four different levels of complexity was included. In addition, the program was updated to properly direct roller-to-raceway contact load vectors automatically in those cases where roller or ring profiles have small radii of curvature. Input and output architectures containing guidelines for use and two sample executions are detailed. R.J.F.

**N82-31969*#** SKF Technology Services, King of Prussia, Pa.
**RESEARCH REPORT: USER'S MANUAL FOR COMPUTER PROGRAM AT81Y003 SHABERTH. STEADY STATE AND TRANSIENT THERMAL ANALYSIS OF A SHAFT BEARING SYSTEM INCLUDING BALL, CYLINDRICAL AND TAPERED ROLLER BEARINGS Final Report**
G. B. Hadden, R. J. Kleckner, M. A. Ragen, and L. Sheynin May 1981 254 p refs
(Contract NAS3-22690)
(NASA-CR-165365; NAS 1.26:165365; SKF-AT81DO40) Avail: NTIS HC A12/MF A01 CSCL 09B

The SHABERTH program is capable of simulating the thermomechanical performance of a load support system consisting of a flexible shaft supported by up to five rolling element bearings. Any combination of ball, cylindrical, and tapered roller bearings can be used to support the shaft. The user can select models in calculating lubricant film thickness and traction forces. The formulation of the cage pocket/rolling element interaction model was revised to improve solution numerical convergence characteristics. S.L.

**N82-31982#** Army Engineer Waterways Experiment Station, Vicksburg, Miss. Automatic Data Processing Center.
**PRIMER ON COMPUTER GRAHICS PROGRAMMING**
Apr. 1982 232 p Prepared in cooperation with Military Academy
(AD-A116257; WES-INSTRUCTION-K-82-3) Avail: NTIS HC A11/MF A01 CSCL 09/2

This report is a tutorial for learning graphics programming with the Graphics Compatibility System (GCS). GCS is a collection of ANSI standard FORTRAN subroutines invocable by a user's FORTRAN program. The report cover's GSC's capabilities. GSC can produce a simple line drawing or handle comprehensive general purpose axis creation and automatic clipped; arc and conic generation; graphics input; secondary coordinate systems; multiple software character fonts; data structures; segmentation; and color. The report addresses both two- and three-dimensional graphics capability within GCS. GRA

**N82-31983#** Army War Coll., Carlisle Barracks, Pa.
**MUTUAL PROBLEM SOLVING THROUGH COMPUTER TIME SHARING**
Robert J. Knez 16 Apr. 1982 45 p refs
(AD-A116718) Avail: NTIS HC A03/MF A01 CSCL 09/2

This paper suggests the use of an on-on computer time sharing system acting in the role of a communications facility serving a community of subscribers who pose problems and tender solutions to one another anonymously. Subscribers to the system may be categorized by professional or academic discipline. They may also be aligned through the creation of associations which the computer will recognize. Subscribers may direct their problems to members of select disciplines, associations or by general broadcast. The system is intended to work throught the mutual cooperation of its anonymous subscribers who are encouraged to make effective contributions by the mutual benefits to be gained as well as through a status based incentive system. Author (GRA)

**N82-31984#** Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
**INVESTIGATE CAPABILITY OF ADA HIGHER ORDER PROGRAMMING LANGUAGE FOR DEVELOPING MACHINE INDEPENDENT SOFTWARE Final Technical Report**
L. J. Gallaher Griffiss AFB, N.Y. RADC Mar. 1982 110 p refs
(Contract F30602-78-C-0120; AF Proj. 5581)
(AD-A116070; RADC-TR-82-46) Avail: NTIS HC A06/MF A01 CSCL 09/2

In this investigation of the ability of ADA to support machine independent software, a library package of the elementary mathematical functions (sin, cos, en, etc.) was implemented and tested on the ADA/ED Compiler Version 11/4. The ADA language constructs proved quite useful and effective in creating the math function package. The programs were written and successfully syntax checked; however, flaws in this version of the compiler prevented a thorough debugging of these routines. The routines were designed to be machine and accuracy independent. Accuracy independence was obtained using variable length polynomials whose coefficients are computed (at compile time) from Chebyshev series. For increased efficiency, the normally machine dependent operations (bit picking) are isolated into subroutines that can be optimized for individual installations and hardware. Author (GRA)

**N82-32298#** Joint Publications Research Service, Arlington, Va.
**OPTICAL FIBER MULTIPLE SENSOR FOR GRIPPING COMPLEX OBJECTS**
Michel Defaux *In its* West Europe Rept.: Sci. and Technol., No. 99 (JRPS-80536) 9 Apr. 1982 p 30-31 Transl. into ENGLISH from L'Usine Nouvelle (France), 11 Feb. 1982 p 48-49

Avail: NTIS HC A04

The development of an experimental grip for industrial robots which provides a sense of touch is announced. Multiple fiber optic sensors (Stafo) are integrated into the structure of the three fingers of the grip. Grasping tests on simple and complex geometrical shapes, and on deformable and fragile objects, incuding eggs, were performed. The grip was designed for use in the assembly of small parts (1 cu decimeter and 1 kg) such as are used in household appliances. J.D.

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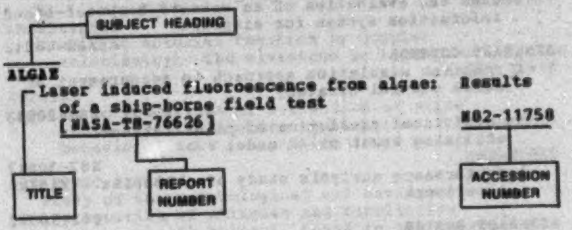

The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

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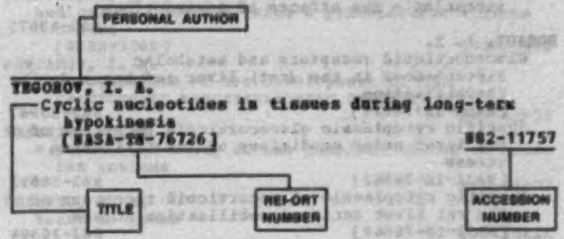

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NASA SP-7011(241)

# A CUMULATIVE INDEX
# TO
# A CONTINUING BIBLIOGRAPHY ON

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This Cumulative Index supersedes the indexes contained in supplements [SP-7011(229) through SP-7011(240)] published by NASA during 1982.

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# INTRODUCTION

## WHAT THIS CUMULATIVE INDEX IS

This publication is a cumulative index to the abstracts contained in NASA SP-7011(229) through NASA SP-7011(240) of *Aerospace Medicine and Biology: A Continuing Bibliography,* NASA SP-7011, and by means of supplements, serves as a current abstracting and announcement journal for references on bioscience and biotechnology. It has been compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA), and the National Aeronautics and Space Administration (NASA). Entries prepared by the two contributing organizations are identified as follows:

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## HOW THIS CUMULATIVE INDEX IS ORGANIZED

This Cumulative Index includes a subject, personal author, and corporate source index.

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Two types of cross-references appear in the subject index:

1. Use (U) references indicate that the subject term is not "postable," i.e., not a valid term, and that the following term or terms are used instead. For example:

    DOSE
      U DOSAGE
    AIRLINERS
      U COMMERCIAL AIRCRAFT
      U PASSENGER AIRCRAFT

2. Narrower Term (NT) references refer the user to more specific headings in the same subject area, under which additional material on the subject may be found. For example:

    FATIGUE (BIOLOGY)
      NT AUDITORY FATIGUE
      NT FLIGHT FATIGUE
      NT MUSCULAR FATIGUE

In addition, a searcher may use the title or title and title extension in the index to narrow further his quest for particular items, this is because subject terms can readily include more than one class of document. For example:

BIOLOGICAL EFFECT
Vibratory force effect upon biological systems, particularly human organism.
Biological effect of cosmic and solar radiations on human body at high altitudes.

illustrates a case where two references on different topics are listed under the same subject term.

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All personal authors used in the abstract-section citations in the individual Supplements appear in the index. Differences in translation schemes may require multiple searching of the index for variants of an author's name. For example:

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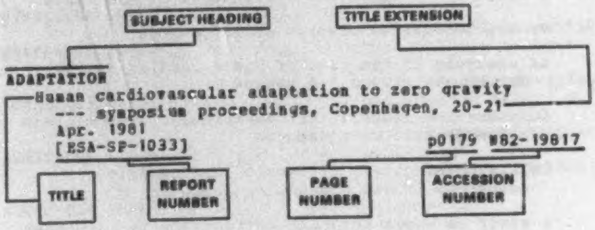

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NT HYPERTENSION
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U BONE MINERAL CONTENT

**BOD**
U BIOCHEMICAL OXYGEN DEMAND

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NT CEREBROSPINAL FLUID
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**BODY TEMPERATURE REGULATION**
U THERMOREGULATION

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[NASA-CR-167460] p0033 N82-12752

Stimulation of body weight increase and epiphyseal cartilage growth by insulin like growth factor
[NASA-TM-84285] p0428 N82-33983

**BOEING AIRCRAFT**
NT B-52 AIRCRAFT
NT C-135 AIRCRAFT

**BOEING MILITARY AIRCRAFT**
U MILITARY AIRCRAFT

**BOMBER AIRCRAFT**
NT B-52 AIRCRAFT

**BOMBS (SAMPLERS)**
U SAMPLERS

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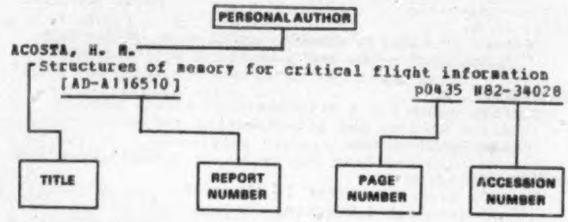

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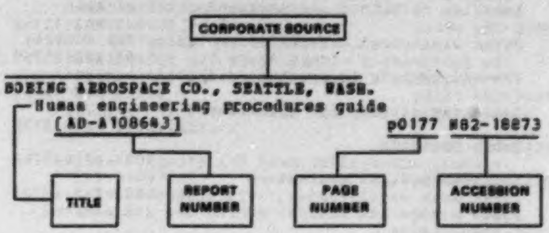

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